

- For *Phragmites* control, develop an adaptive management framework so that treatments are monitored and evaluated for effectiveness. The refuge will be using an integrated approach to *Phragmites* control, which will consider restoration of natural processes, herbicides, prescribed fire, biocontrol, and other tools as they are developed.
- Restore the natural hydrology of coastal plain depressions swamp communities (Unit III south of Prime Hook Beach Road).
- Consider selective thinning or girdling trees adjacent to sensitive cattail sedge (*Carex typhina*, S3) and slender blue-flag iris (*Iris prismatica*, S2) within the coastal plain depression swamp community.
- Utilize best management practices and other management actions to protect rare plant communities, such as the southern twayblade orchid and swamp cottonwood, as is feasible and consistent with other management objectives.

Monitoring Elements

Conduct appropriate monitoring and survey programs as funding and staffing permit to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, or reevaluation or refinement of our objectives. Details of planned monitoring will be developed in a subsequent inventory and monitoring plan. Examples of monitoring or surveys that we may implement include:

- Prevent new invasive species from becoming established by utilizing early detection rapid response techniques that detect newly established invasive species, and immediately addresses those populations through the appropriate control measure. This strategy will incorporate a combination of plant identification and inventories, maintaining updates of new invasive species present in the region, and knowing the appropriate management techniques prior to conducting control efforts.
- Establish point-count monitoring surveys for each habitat cover-type listed in objective 2.3 to determine nesting landbird use of targeted wetland forest resources of concern.
- Obtain GPS location data from DNHP to document rare flora and fauna locations on refuge GIS database.
- Continue inventories for rare species to better determine their distributions on the refuge through establishing monitoring plots and assess conservation status every 3 to 5 years.

Climate Change and Sea Level Rise Adaptation Rationale

Wetlands with long periods of inundation or surface saturation during the growing season are especially effective at storing carbon in the form of peat, though there are uncertainties associated with carbon storage in wetlands. Riparian wetlands can also capture carbon washed downstream in litter, branches, and sediment. Because they accumulate sediment and bury organic matter, floodplain and tidal wetlands, including forested wetlands, are especially effective as carbon sinks. These lands also reduce nutrient, sediment, and other pollution entering the Delaware Bay and other bodies of water.

Climate Change and Sea Level Rise Adaptation Strategies and Monitoring

Forest wetland management strategies include those listed above and in objectives 2.1 and 2.2.

GOAL 3.

Refuge Impounded Marsh Complex

Maintain the quality of the wetland habitats within and surrounding the refuge's wetland impoundment complex for migrating shorebirds, breeding rails, wading birds, American black ducks, and migrating and wintering waterfowl consistent with the BIDEH policy. Support other native wetland-dependent species and provide fish passage and nursery habitats for anadromous fish species.

Objective 3.1 Wetland-dependent Breeding, Migrating, and Wintering Birds

Provide up to 4,200 acres of healthy brackish wetlands and salt marsh to meet the needs of a wide variety of wetland-dependent migratory birds, including rails, bitterns, terns, migrating shorebirds, and migrating and wintering waterfowl, by restoring salt marsh and brackish vegetation communities and natural wetland processes in the impounded wetlands in Unit II and Unit III. Successful restoration will include the following elements:

- Restoration of the natural tidal range and salinity with a physical connection to the marine environment for exchange of nutrients, organic matter, and biota.
- Restoration of the natural sediment budget to counter wetland subsidence.
- Improvement of water quality realized by restored salinity and pH.
- Control of invasive plants to less than 5 percent cover, once salt marsh vegetation is established.
- Reestablishment of native salt marsh vegetation communities, with a moderate (20 to 25 percent) component of open water and mudflats.
- Return of native salt marsh wildlife species, including salt marsh obligate birds.
- Improvement of estuarine fish and shellfish habitat.

Rationale

The refuge's impounded marshes represent large wetland patches greater than 1,000 acres in area, which are attractive to wetland-dependent breeding and migrating birds and significantly contribute to wetland biological diversity and integrity at both the refuge and State landscape levels. Even as these wetlands undergo changes as a result of storm activity and coastal processes, the refuge remains committed to providing high-quality wetland habitat for a diverse assemblage of migratory birds in a manner that is effective and sustainable. The emphasis is on active restoration of healthy salt marsh and brackish wetland conditions within wetlands formerly managed as freshwater impoundments. This objective represents the refuge's most significant and tangible shift in habitat management, and is covered here in detail. This shift in habitat management serves as an immediate response to local manifestations of climate change, and is a proactive adaptation in anticipation of likely future changes. However, given the road infrastructure in place, these wetlands will remain at least partially impounded for the foreseeable future, and thus require active management and restoration. Active management of water levels will continue to play a role in influencing habitat conditions, and potentially as a tool for salt marsh restoration. Management strategies in sensitive freshwater wetlands and restoration in inland wetland areas will still be pursued to the extent feasible.

The SLAMM model (Scarborough 2009) and the State's inundation maps (DNREC, unpublished) suggest changes in landcover and losses of tidal wetlands on the refuge in the next 50 to 100 years. Portions of the refuge's marshes or impoundments may have already reached a tipping point. It is important to note that the timeframe of impoundment management has been relatively short on the refuge, in relation to the timeframe of natural coastline processes. Relatively speaking, freshwater impoundment management is not a long-standing

management regime on the refuge. It was conceived to meet valid wildlife management objectives but was established in part using existing roads as dike infrastructure that had not been formally engineered for long-term water level management. In developing a memorandum of agreement with DNREC, during the time the impoundment infrastructure was established, it was acknowledged that the lifespan of the facilities would be 20 years, a time span which has now passed. Evidence from numerous sources, as described in chapter 3, clearly indicates that the wetlands on the refuge were historically salt marsh, although there had always been areas of freshwater marsh due to natural freshwater inputs or altered hydrology resulting from human activity.

As information in chapter 3 outlines, portions of the managed impoundments are losing ground to sea level rise and other manifestations of climate change, such as shoreline erosion. While the visible vegetation and wildlife response was favorable during the decades of impoundment management, significant problems were developing beneath the surface. For example, Unit II is accreting new sediment at a pace that is half the documented rate of local sea level rise. It is not reasonable to expect that such a large deficit in elevation-capital can be recovered within Unit II under current freshwater impoundment management strategies. Freshwater marshes dominated by annual vegetation differ from salt marshes in that predominantly annual wetland plant vegetation contributes to high above-ground biomass, whereas the persistent below-ground organic matter of perennial vegetation, such as that found in tidal salt marshes, makes greater contributions to vertical accretion (Cahoon et al. 2009). Impounded freshwater wetlands would be difficult and costly to reestablish, and more importantly are not sustainable in a dynamic coastal setting for the long term.

The reality of these various factors, operating in combination to create significant management challenges, requires a shift in refuge wetland management objectives and strategies. Our refuge goals and objectives strive for successful management of a variety of wetland habitat types, including both salt marsh and freshwater wetlands. But, it is our responsibility to manage for these community types where conditions are appropriate. As our evaluation of the available data illustrates, a shift in management is necessary to ensure healthy wetlands, rather than permit artificially created freshwater wetlands to convert to open water because they are not keeping pace with rising water levels. Although open water environments are not without ecological value, such an outcome would not directly support the wetland objectives outlined in this CCP. It is neither responsible nor sustainable to indefinitely maintain freshwater impoundments along a coastal environment.

It has been determined through analysis of the many complex factors outlined in chapter 3 (influence of climate change on physical environment and refuge management) that continued management of freshwater impoundments for the long term is not appropriate. There is no inexpensive and practical way to freeze the dynamic nature of the impoundment complex at this ecologically and geologically unstable point. Continued freshwater impoundment management would simply not be sustainable. Management action will be necessary to stabilize the health of the degraded system. If no active restoration is undertaken, it is unclear how quickly or effectively the area, in Unit II in particular, would revert to salt marsh vegetation on its own, given the existing elevations and degraded state of the sediments (Williams and Orr 2002). It is also possible that large areas of open water will form instead (Pearsall and Poulter 2005, Williams and Orr 2002, Portnoy and Giblin 1997, DeLuane et al. 1994). In the absence of a healthy marsh community or sufficient wetland elevation within the interior of Unit II, the shoreline along the bay will remain vulnerable to breaches and overwash during storm events. The most practical and economical management alternative to restabilize the impounded wetlands is carefully executed restoration. Furthermore, an established salt marsh will be able to migrate landward into adjacent refuge uplands, as sea levels rise, in a process that represents the natural adaptation of the coastal ecosystem.

Ultimately, restoration of the refuge impoundments to healthy brackish and salt marsh will encourage the conditions most resilient to sea level rise, while providing valuable habitat for waterfowl, salt marsh obligate passerines and waterbirds, shorebirds, and other wildlife. Furthermore, additional healthy salt marsh in the refuge's wetland complex will provide benefits to neighboring human communities that the freshwater impoundments could not provide, or certainly could not provide in a self-sustaining manner. The presence of salt marsh vegetation in coastal marshes can reduce shoreline erosion by reducing wave energy. Wave heights are reduced by 60 percent within the first 20 feet of the marsh, which in turn also increases the potential for sediment deposition (Morgan et al. 2009, Broome et al. 1992) Because they are perennials, salt marsh plants develop extensive root systems that improve soil stability through deposition of below-ground biomass; thus, over time salt marshes will accrete vertically to better keep up with sea level rise (Cahoon et al. 2009, Reed et al 2008, Knutson 1988) and serve as a buffer to adjacent uplands. Through greater stability and resilience, a healthy salt marsh will provide neighboring communities with more flood protection than an artificially sustained freshwater wetland or open water. Restoration of salt marsh vegetation within impounded wetlands is a key climate change adaptation approach.

Active restoration is more effective than passive restoration in wetlands with degraded conditions (NOAA 2010). The preferred means of restoration will be the incremental increase in the exchange of tidal floodwaters between the Delaware Bay and at the water control structure in Slaughter Canal. Ideally, tidal restoration will occur gradually over an extended period and will entail concurrent monitoring of environmental response to assess the achievement of project objectives, including assessment of public and stakeholder concerns (Smith et al. 2009). This method is advantageous because the rapid reintroduction of saltwater to a system that has been primarily fresh can cause rapid and extensive death of salt-sensitive plants, which can impose further problems with sediment loss, erosion, and subsidence through peat collapse (Smith et al. 2009, Pearsall and Poulter 2005, Weinstein et al. 2000, Portnoy and Giblin 1997, DeLuane et al. 1994). It is difficult to successfully monitor such a rapid change and, regardless of our monitoring and management efforts, the response will be difficult to accurately predict. A critical factor in the restoration design process is achieving tidal flooding up to the spring high tide elevation in order to restore ecologically sustainable estuarine communities by restoring sufficient tidal exchange to flood and drain the wetland effectively (Williams and Orr 2002).

The refuge must also evaluate and address the elevation of the wetlands to be restored, in relationship to the growth range of desired species (e.g., *Spartina alterniflora*), because elevation is a critical factor in establishing salt marsh vegetation (Weinstein et al. 2002, McKee et al. 1989, Baca and Kana 1986). The sand-starved system may require decades or more to naturally recoup the elevation already lost in portions of the wetland complex from peat collapse in the manipulated freshwater sediments. In the absence of sufficient elevation, portions of the wetlands will convert to open water (this has already occurred in some areas). Ideally, open water should compose only 20 percent of restored Delaware Bay salt marsh wetlands (Weinstein et al. 1996). Although open water environments are not without value to wildlife, they can contribute to erosion and inhibit the return of salt marsh vegetation, especially in large sites such as Unit II and Unit III (Williams and Orr 2002).

Salt marsh vegetation will establish more readily if there is sufficient elevation in place, which in turn will facilitate further accretion and salt marsh development (Boumans et al. 2002). This prompts the consideration of assisted accretion through the addition of supplemental sediment by some means (e.g., thin layer deposition of dredge material or modified beach nourishment) or through engineering techniques that reduce wind and wave fetch across expanses of open water and encourage the natural capture and deposition of sediment throughout the wetland complex (Weinstein et al. 2000). In addition, the refuge will limit

the control of *Phragmites* to only areas identified in the fire management plan as a primary wildlife urban interface treatment zone for the purposes of fuels control. Although not a preferred wetland species for habitat value, the presence of *Phragmites* can help to trap sediment, preserve wetland elevation, and reduce peat collapse.

While a carefully monitored, gradual reintroduction of saltwater into the impoundment complex is a preferred management option (Smith et al. 2009), the feasibility of such an approach depends on some factors beyond the refuge's immediate control. The shoreline, for example, is extremely vulnerable to overwash, but cannot readily be engineered to prevent breaches, and the refuge may have little control of water levels and salinity within the impounded wetland without substantial intervention. In addition, it can be difficult and costly to find large amounts of supplemental sediment for restoration of elevation, but the refuge will work with partners to seek such opportunities. The restoration plan for the wetland will include an iterative and adaptive approach to manage incremental restoration in response to observed and measured conditions (Teal and Weinstein 2002). Although the conditions at the refuge are somewhat unique, given the management history, there are examples of successful salt marsh restoration projects throughout the eastern U.S., including in the Delaware Bay, which provide valuable guidance (NOAA 2010; Smith et al. 2009; Herring River Technical Committee 2007; Teal and Weinstein 2002; Warren et al. 2002; Weinstein et al. 2000, 1996; ACOE 1996; Roman et al. 1995; Baca and Kana 1986).

For Unit III, the future of management is less certain, although management capabilities are still somewhat intact, and management infrastructure not as compromised. The natural freshwater inputs within Unit III dictate that under any management or restoration scenario, it would likely retain more brackish marsh characteristics and vegetation than Unit II would. However, it may also be at risk for new *Phragmites* invasion. Although the objective for Unit III is also to develop a healthy self-sustaining wetland rather than continue to manage strictly as a freshwater impoundment, the specific fate of Unit III may depend on the actions taken and outcomes realized in Unit II restoration efforts. It is anticipated that this will be a salt marsh dominated-system in the areas dominated by saltwater inputs, and brackish to freshwater in areas with greater freshwater source. Factors such as the pace of Unit II restoration, how natural storms events may affect the wetland complex, modifications of Prime Hook Road by DelDOT, when and whether sediment from outside sources is added, etc. may all affect the pace and choice of restoration actions but not the long-term goal, which is a habitat that is consistent with BIDEH. The refuge will need to adapt future management direction and actions in Unit III, depending on the progress of management and restoration in Unit II, which directly influences Unit III. Coastal refuges in the Northeast Region are currently developing a structured decision tool that can be used to weigh the costs and benefits of maintaining an impoundment and reach a decision about whether to restore or maintain it. Since this model will be science-based, developed through a structured decisionmaking process and have technical expert review, and consistency with other refuges, Prime Hook NWR plans to use the coastal impoundment structured decision-making model to evaluate future management direction for the Unit III impoundment. Currently the refuge is collecting the data necessary to populate the decision model in order to further evaluate management options.

While the active restoration of salt marsh within the refuge's impounded wetlands is the underpinning of this objective, the development of a detailed wetland restoration plan is outside the scope of this CCP process. However, there have been a number of formal discussions regarding restoration options and strategies with a diverse group of wetland management and restoration experts, state officials, and the Army Corps of Engineers.

The refuge has been in contact with the Army Corps of Engineers and with DNREC since the summer of 2011 regarding the potential use of dredged

sediment to restore wetland elevation in the impoundment complex. Such sediment could come from the Main Channel Deepening Project, maintenance dredging. Because the material is a State resource, DNREC has primary authority over how and where it is used. Marsh restoration at the refuge is only one of several beneficial use possibilities that are being considered.

In May 2011, the refuge convened a group of world-renowned wetland management and restoration experts from outside Delaware for a meeting with refuge staff and a number of DNREC scientists and managers. The invited group of scientists included Dr. Donald Cahoon (USGS, Patuxent Wildlife Research Center), Dr. Norbert Psuty (Rutgers University), Dr. Charles Roman (National Park Service, Cooperative Ecosystem Studies Unit, University of Rhode Island), and Patricia Rafferty (National Park Service, Jamaica Bay Wildlife Refuge, New York). These scientists represent a wealth of experience in studying, managing, and restoring degraded wetlands throughout the U.S. The group reviewed preliminary monitoring data and toured the refuge's shoreline and wetlands firsthand. They provided feedback and recommendations at the end of the meeting and during follow-up discussions. A similar follow-up workshop was held in April 2012, which included the participation of additional academic experts (e.g., Court Stevenson of the University of Maryland) as well as several community representatives. Participants examined the primary restoration options that the refuge faces, and also proposed restoration scenarios to be examined in more detail through hydrological modeling. A summary of this workshop can be found online at: <http://www.dnrec.delaware.gov/coastal/DNERR/Pages/CTP%20Pages/Prime-Hook-Restoration-Workshop.aspx> (accessed August 2012).

Throughout the summer of 2012, the refuge continued discussions regarding restoration options with two engineering firms and with the Partnership for the Delaware Estuary, to further evaluate and develop restoration options and techniques, including actions that could be taken soon after the CCP is finalized. These partnerships will continue into the implementation phase of marsh restoration. These have included both large-scale wave attenuation strategies and products suitable for the high-energy shoreline interface, and small-scale living shoreline projects suitable for the marsh interior. The resulting suggestions from these various meetings and discussions have been incorporated into the CCP as potential restoration strategies, outlined below.

For example, although an infusion of additional sediment is critical for restoring lost elevation behind the fragile refuge shoreline, the refuge also considers strategies to encourage and accelerate natural accretion of sediment within the wetland complex. The refuge has examined both short and long-term solutions, which vary tremendously regarding cost, deployment time, and engineering analysis requirements. Engineered solutions do exist for attenuating waves and encouraging sedimentation in moderate- and high-energy settings, such as various manufactured concrete structures (e.g., wave attenuation devices, beach prisms, reef balls). These type devices are designed to attenuate wave energy thus reducing erosion and would be more effective than concrete structures not designed for these purposes, such as jersey barriers (designed specifically for traffic control). Relative to rock and rubble structures, these type structures can be designed to provide an effective means to stabilize the shoreline and breach locations. Although wave attenuation may be lower with manufactured structures than with rock and rubble structures, they can allow for passage of fish, crabs, and other species (Douglass et al. in press). One cost estimate obtained suggested at least \$1 million for an installation of wave attenuation devices near the mouth of the breaches that would be sufficient to have the necessary effect (Cardno JFNew Consulting, personal communication). The Coastal Engineering Manual provides extensive design methodologies for implementing rock and rubble mound structures (USACE 2002). As with manufactured concrete structures, rock and rubble mound structures require hydrodynamic modeling to design

properly and can be costly to implement on the scale necessary at the refuge. There are no means to attenuate wave energy through the breaches that would not require careful planning and engineering, to ensure that the water and energy do not simply scour around the structure(s) and impact the refuge potentially forming new breaches and inlets at other locations throughout the shoreline.

Geotubes are another structural technique that have some potential. However, geotubes do not contribute sand to the local sediment system, can affect adjacent shoreline negatively, are prone to failure and vandalism, and are not designed to withstand large-scale storms (McKenna 2001). Geotubes would also likely require the addition of sand to anchor the tubes, a nourished beach in front of the tubes, and may require frequent maintenance as sand is washed away (Gibeaut et. al 2003, McKenna 2001).

Living shoreline techniques using materials such as coconut logs, oyster shell breakwaters, and grass plantings are suitable in low energy settings and can help restore marsh in targeted areas (PDE 2012, PDE 2011). The refuge has been in close contact with the Partnership for the Delaware Estuary regarding potential living shoreline projects on the refuge, and has already shared preliminary site information for consideration.

It has been the consensus of these diverse partners that the refuge has a number of potential restoration options, both big and small, which have been included here, but that additional hydrological modeling and analysis is important before the implementation of large-scale restoration efforts. The refuge proposes to continue working with diverse wetland management and restoration experts, State and Federal officials, and community representatives as restoration short- and long-term plans are developed. Potential restoration strategies to be considered are derived from the salt marsh restoration scientific literature and consultation with wetland experts and other partners. The public will be given opportunities to learn about restoration plans as they are developed, and provide feedback to the refuge staff and restoration team. Public involvement is recognized as a critical element for successful restoration projects (NOAA 2010). The impacts of the potential restoration strategies outlined below were evaluated in chapter 5 of the draft and final CCP/EIS, and some or all of the strategies may be implemented in some combination, as determined to be appropriate, feasible, and fundable, during later restoration planning.

Strategies

- Implement water level management and vegetation control strategies, to the extent conditions warrant and permit:
 - * If feasible, seek to keep Unit III water levels, in accordance with deed restrictions, at or below a level of 2.8 feet mean sea level between October and March 10th, but if future storm events preclude the ability to manage water levels, then natural levels will prevail.
 - * Control invasive species using chemical control, prescribed fire, and other techniques as appropriate so that 95 percent native vegetation is achieved. The exact number of acres treated will depend on funding and management capability.
 - * Restore prior converted wetlands and riparian areas on approximately 250 acres.
 - * Restore artificially drained and ditched upland areas to improve hydrology around vulnerable communities.

- ✱ Consider planting a green browse crop, such as clover, over managed areas when manipulating the soil to set back succession, in order to provide supplemental food for waterfowl.
- Utilize the regional impoundment management structured decision-making model in order to evaluate and validate management options for refuge impoundments.
- Discontinue all management and construction of dunes on private land.
- In partnership with DNREC Delaware Coastal Program, and a private contractor, continue development of a model to predict the hydrodynamic response of the wetland complex under a wide variety different potential management and restoration scenarios, such as closed inlets, opened inlets, one inlet opening in response to a storm event, purposeful inlet deepening, Fowler Beach Road removed, Prime Hook Road culverts closed, additional Prime Hook Road openings installed, water control structure at Slaughter Canal/Fowler Beach Road removed, etc. The model will help evaluate what hydrological and vegetation responses may be expected under each scenario.
- Continue consultation with State and Federal coastal scientists, non-profit organizations, engineering firms, academic scientists, other subject matter experts, and community representatives to further explore management options and develop a wetland restoration plan for refuge impoundments.
- Host public forums during restoration planning and implementation to describe the process and techniques under consideration and provide the opportunity for public input.
- Within 1 to 3 years, implement short-term restoration strategies, even as large-scale and long-term restoration plans are developed. These strategies may include some or all of the following:
 - ✱ Continue development of a hydrological model, as described above, to evaluate long-term restoration options.
 - ✱ Partner with the Partnership for the Delaware Estuary to plan and implement appropriate application of living shoreline techniques (e.g., coconut logs, Christmas tree fences, oyster shell breakwaters) within the Unit II interior along public roads and neighboring private property to slow wave fetch across large expanses of open water, which may reduce marsh erosion and facilitate the deposition of sediment and establishment of salt marsh vegetation.
 - ✱ Further evaluate the potential applicability and installation of engineered wave dissipation devices, such as pyramid-shaped or spherical concrete structures designed explicitly for moderate or high-energy settings. Examples include GeoTubes, wave attenuation devices, beach prisms, artificial reefs.
 - ✱ Work with DNREC on shoreline stabilization with material from Delaware River Deepening project, maintenance dredging, and other sources within the Delaware Bay. Reevaluate the easement limiting water level management to a height of 2.8 feet with the impoundment, possibly renegotiating or removing the agreement.

- Within 15 years, implement a comprehensive restoration plan to restore healthy self-sustaining wetlands in refuge impoundments, utilizing methods determined with the assistance of the restoration advisory team and other experts to be most appropriate and effective. Following establishment of healthy salt marsh, strategies outlined under objective 1.3 will become applicable. Specific potential strategies include:
 - * Explore the potential benefit of constructing temporary dikes or berms to create cells within the impoundments to foster sediment deposition and salt marsh vegetation establishment.
 - * Work with the Army Corps of Engineers and DNREC to assess the availability of suitable dredge material to assist in restoring lost elevation within Unit II or Unit III necessary for the establishment of *Spartina*.
 - * Examine the financial and ecological feasibility of reintroducing sand from an outside source into the local sediment transport cycle through a modified beach nourishment project. It must be clear that such a project would not be conducted to create a static beach or dune, but would restore coastal sediment dynamics by replacing lost sand, which would be naturally transported into the back barrier wetlands to improve elevations for vegetation growth.
 - * If predicted from hydrodynamic modeling analysis to be beneficial for marsh restoration, work with DelDOT on the abandonment and appropriately-timed removal of Fowler Beach Road to provide unimpeded tidal flow between Unit I and Unit II or, minimally, the installation of large openings under the road to increase and improve tidal flow. DelDOT has sole authority over decisions regarding Fowler Beach Road.
 - * Determine the potential benefit of clearing internal channels within Unit II, such as the old Slaughter Creek channel, with the cookie cutter to improve tidal flow throughout the Unit.
 - * As areas of suitable growing conditions are achieved in portions of the impoundment complex through the management strategies above, consider supplementing the vegetation through planting of salt marsh plants, such as *Spartina* spp.
 - * Cease the treatment of *Phragmites* in areas that are susceptible to marsh loss; although not a desired vegetation species, its presence in vulnerable areas will help retain sediment elevation and slow conversion to open water. *Phragmites* will still be treated in areas identified in the fire management plan as a Primary Wildlife Urban Interface Treatment Zone.
 - * Work with DelDOT to ensure that improvements to Prime Hook Road will permit optimal management or restoration of Unit III, based on the outcome of modeling analysis. DelDOT has sole authority over decisions to alter Prime Hook Beach Road.

Monitoring Elements

- Resurvey all water-control structure staff gauges to a single geodetic reference and accurately reposition gauges to reflect current mean sea level.
- Within 1 to 2 years, establish a refugewide elevation-capital (marsh surface elevation) monitoring program across the two management units, as outlined in more detail in the climate change adaptation strategies under objective 1.3. In addition to monitoring stations in existing salt marsh, 12 stations will be established in currently impounded areas (6 in Unit II and 6 in Unit III) with surface elevation tables and marker horizons.

- Expand efforts to use real time kinematic surveys and underwater sonar technology to monitor elevation throughout the wetland complex, which is less precise than surface elevation table measurements, but can be conducted on a broader geographic scale.
- As deemed necessary, continue to collect water quality samples through grab-sampling and automated sampling; samples are analyzed in partnership with the State through a cooperative agreement.
- Implement the National Park Service's vital signs program's shoreline position monitoring protocol and shoreline topography monitoring protocol. Coordinate refuge shoreline monitoring efforts with other coastal refuges to foster Departmentwide sharing of standardized monitoring data.
- Monitor the use of refuge impoundments by waterfowl, shorebirds, passerines, and other waterbirds, in all phases of transition and restoration, in accordance with established protocols such as integrated waterbird management and monitoring; as feasible, coordinate research with academic partners, such as the University of Delaware, and with DNREC.
- Seek opportunities to monitor other species groups such as fish within the wetlands during all phases of transition and restoration, potentially through partnerships with academic institutions, such as Delaware State University, or other organizations.
- Utilize the regional salt marsh integrity index and other suitable monitoring programs as a measure of the success of restoration efforts over the next 15 years.
- Update existing vegetation mapping within the wetland complex to reflect changing vegetation and open water conditions, and repeat as needed and practical; explore the utility of archived satellite imagery for vegetation and open water change analysis.
- Utilize early detection rapid response techniques that detect newly established invasive species and immediately address those populations through the appropriate control measure.
- Develop improved monitoring and inventory program, such as outlined in the integrated waterbird management and monitoring program, to assess annual habitat conditions created through management and restoration in all wetland areas and associated bird use.
- Implement water and soil salinity monitoring to inform decisions about wetland response to management and restoration.
- Obtain location and distribution data of known rare plant and animal populations from DNHP and store on the refuge GIS database.
- Continue research inventories and studies on the viability and persistence of existing rare plant populations and associated rare faunal species; determine life history requirements for rare plants and animals currently on the refuge to improve future habitat management.

Objective 3.2 Manage Water Quality for Trust Fishery Resources, Migratory Birds, and Resident Wildlife

Over the next 15 years, protect and improve the water quality of 6,000 acres of impounded marsh and waterways and aquatic habitats and delineated buffer zones to provide clean water to safeguard and enhance the quality of breeding and nursery habitats for river herring (alewife, blueback herring), American and

hickory shad, striped bass, American eel, and other fishery resources to conserve healthy populations of fish, breeding and migrating birds, and resident wildlife.

Rationale

Many of the refuge's natural resources are water-dependent, and adequate quantities and quality of freshwater are of paramount importance to conserve and manage trust wildlife resources. Protecting healthy aquatic habitats, conserving fish and other aquatic organisms, and managing targeted migratory and breeding birds identified in this CCP will require clean water and good water flow and circulation within the refuge's impounded wetland habitats. Cyclic ditch cleaning is the only way to preserve good water circulation within the impoundments.

In addition to perpetuating healthy migratory bird populations, the Service is committed to restoring and conserving America's fisheries resources (National Fish Habitat Action Plan 2006). Over one-third of the Nation's freshwater and anadromous fish species are threatened. It is increasingly urgent to identify and implement actions that will reverse declining trends in fish health and populations before it is too late. Protecting the health of aquatic habitats and restoring fish and other aquatic resources is a very high Service priority.

The Atlantic States Marine Fisheries Commission data and management plans targeting declining species was used to identify and prioritize refuge aquatic and fisheries resources for this CCP. River herring, striped bass, and elvers are top resources of concern for the refuge. The conservation of river herring (alewife and blueback herring), striped bass, and other anadromous fish plus the American eel depend on freshwater habitats that are used by spawning adults and required by fry and early juveniles of these species.

Restoring salt marshes that function naturally requires reestablishing desirable vegetation on the marsh plain, restoring a natural hydroperiod, and maintaining or creating elements of marsh habitat such as tidal creeks, ponds/pannes and vegetated areas. These tidal creeks are part of the intertidal drainage system that allow fish foraging and the exchange of sediments. So the natural function of salt marshes not only is tied to the vegetation on marsh plain but the well developed system of tidal creeks. Weinstein et al. 1997 and 200 outlined the importance restoring the hydrology by maintaining or creating tidal channels. The number of ditches quantified in the strategies below are for freshwater impoundment management. We may need to restore some of these ditches if determined they are no longer needed. The marsh restoration plan may tell us which ones to keep or restore.

Strategies

- Repair, replace, and upgrade water control structures, fish weirs, flapgates, flaplogs, and conventional logs as needed.
- Conserve and improve tidal flows into the salt marshes of Units I and IV by permitting natural coastal processes, such as overwash and inlet formation, to proceed unhindered.
- Continue to provide and improve optimal fish passage capability for anadromous fish in Units II and III.
- Create new or widen existing vegetated riparian buffers greater than 300 feet composed of native vegetation (trees and shrubs), by connecting isolated or disjunctive patches around refuge creeks, waterways, and marshes, through assisted reforestation projects or allowing natural succession to occur.

- Maintain and/or restore water movement and circulation within existing drainage networks of the refuge's former impoundment complex to improve the hydrology of the salt marsh by developing as appropriate tidal drainage systems; drainage networks may include up to 6.2 miles of ditches in Unit II impoundment, up to 7.5 miles in Unit III impoundment, and up to 3,300 linear feet in Unit IV Impoundment. Ditches not needed for marsh restoration may be plugged or allowed to fill in.
- Participate in partnerships with other State and Federal agencies to address interjurisdictional fish and State rare fish issues.
- Participate in spill prevention, control, and countermeasure plans or other environmental emergency action plans as related to protection of Prime Hook NWR's aquatic and terrestrial resources.
- Implement field management and restoration prescriptions outlined in the habitat management plan (appendix B).

Monitoring Elements

Conduct appropriate monitoring and survey programs as funding and staffing permit to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, or reevaluation or refinement of our objectives. Details of planned monitoring will be developed in a subsequent inventory and monitoring plan. Examples of monitoring or surveys that we may implement include:

- Conduct refuge fishery inventories every 5 years to assess fishery health and water quality of aquatic habitats. Document information such as species composition, class size and distribution, abiotic conditions and other information to adjust management prescriptions as needed and recommended by the Service's Fishery Division. Surveyed areas should include Turkle, Fleetwood, Goose, and Flaxhole Ponds and Prime Hook Creek. Analyze data and provide management recommendations (seasonal closures, creel size and species limits or catch and release) to adjust to public use regulations on these closed systems.
- When cleaning ditch systems ensure that at least 75 percent of the ditch depth is free of sediment along ditch courses and the entire length is free of obstructions that impede water flow.
- Conduct water quality monitoring, in cooperation with partners; parameters to measure include salinity, dissolved oxygen, ammonium, nitrate and nitrite, ortho-phosphorus, total dissolved nitrogen, phosphorus, and chlorophyll A/pheophyton.

GOAL 4.

Early Successional Upland Habitats

Maintain, enhance, and restore the native vegetation, biological diversity and ecological integrity of early successional upland habitats to create a mosaic of early successional habitats mixed with transitional forested areas to conserve migratory birds, breeding landbirds, and endangered species and to maximize benefits for other priority resources of concern.

Objective 4.1 Transitional Habitats: Grasslands, Shrublands, and Young Trees

Within the next 15 years, restore and maintain early successional areas to represent the historic range of variability for upland transitional habitats. These habitats will be dominated by native vegetation reflecting several seral stage distributions that mimic historic conditions. Transitional habitats will usually be small in size and imbedded within a habitat matrix of wetland and upland forested habitats. Create a continuum of natural habitats to include a mosaic of

grassland, transitional, young and old shrublands, and young forest habitats on 2,000 acres undergoing restoration to native vegetation (included those areas planted in trees or transitioning through natural succession for Delmarva fox squirrel management purposes).

Maintain at least 20 percent of the above acreage in an early successional condition (shrubland or grassland mix) to meet the needs of priority resources of concern. These habitats will support high-priority breeding and migrating birds identified in BRC 30, PIF 44, the State Wildlife Action Plan (2005) and BCC (USFWS 2008a) lists and include the following prairie warbler, blue-winged warbler, northern bobwhite, brown thrasher, whip-poor-will, willow flycatcher, eastern towhee, field sparrow, and Henslow's sparrow.

Rationale

By managing native plant succession from early pioneering stages through climax communities through seral stages, we will simultaneously accommodate multiple priority focal species that will be able to use a wide diversity of ecological niches that develop with this habitat management scheme. These lands will be managed in a transitional and ever-changing state.

The reduction in areas and diversity of shrub-land dominated communities has also taken a toll on obligate invertebrates of this habitat type. Tiger beetle conservation status throughout the northeast also exemplifies the rarity of shrublands on the landscape; two are federally listed and 19 are ranked as S1 by several heritage programs throughout the region. Likewise more than two thirds of Lepidoptera listed as S1 and S2 throughout the Northeast are obligates of non-forested early successional communities. The native forbs that grow interspersed in a thicket matrix also support substantial invertebrate richness and abundance (Litvaitis et al. 1999).

Ecological Model for Managing Shrubland Birds

Most early successional communities are temporary and dynamic in nature, constantly changing as more shade-tolerant trees replace sun-loving shrub species. Since old fields and shrubland habitats are relatively short-lived (20 to 25 years), recurring active management must be conducted to maintain desired habitat structure. Shrubland communities are disturbance dependent, but no single prescription effectively manages every successional community. Given the highly ephemeral nature of these successional communities, maintaining specific stages will require strategic periodic disturbance activities to sustain them and constant monitoring to cue the management actions (figure 4-1).

Peterjohn (2006) suggests that it is more practical to direct management toward maintaining generalized categories of shrubland seral stages rather than targeting specific plant community composition. To manage shrubland seral stages on the refuge, we will use his ecological model for managing breeding shrubland birds in the Mid-Atlantic region. These managed successional stages include transitional shrublands, young shrublands, and older shrublands. Restoring, improving, and maintaining shrubland areas interspersed with grassland and forested areas is conducive to creating a continuum of shifting mosaics of various sized patches and configurations that will benefit a large suite of priority breeding and migrating songbirds. For example, many birds of mature forests heavily use shrubland habitats during the postbreeding period. Dense vegetation and abundant fruit resources found in early successional forest and shrubland habitats have been shown to be very important for survival of mature forest birds during the postbreeding period (Vitz and Rodewald 2007).

Abundant fruit resources produced in shrubland habitats provide an easily captured food source but also attract insects, further enhancing foraging opportunities for both adult and juvenile mature-forest dependent birds during migrational periods. Dense shrub cover also decreases the need to move widely

in search of food and reduces energy loss and exposure to predators. Fruits have high sugar content that aids in accumulating fat reserves to facilitate migration (Parrish 2000).

All the priority shrubland species listed in objective 4.1 utilize old fields with different levels of woody intrusion. Prairie warblers, field sparrows, and willow flycatcher prefer relatively young old fields with scattered shrubs and trees with moderate shrub cover. These species do not like later successional stages where shrubs or saplings form dense continuous tangles. By comparison, brown thrasher, eastern towhee, and blue-winged warbler prefer later-stage old fields with moderate to dense shrub cover, and white-eyed vireo and yellow-breasted chat also benefit.

Review of the life history requirements of targeted birds shows that none of the shrubland-dependent species has very specialized habitat requirements, so they can be readily placed into the three distinct shrubland bird guilds—field specialists, ubiquitous species, or multiple habitat species—described by Peterjohn (2006) for shrubland birds in the Mid-Atlantic (see table 4-3).

- **Field specialists:** restricted to larger (5 to 50 acres/2 to 20 ha) patches of shrubland habitats.
- **Ubiquitous species:** occurring along linear edge habitats and fields, such as bushy woodland edges, roadsides, hedgerows, and other corridors less than 33 feetwide (10 meters).
- **Multiple habitat species:** requiring other habitats in addition to shrublands for breeding.

Table 4-3. Shrubland bird ecological requirements

Shrubland Bird Ecological Requirements	
FIELD SPECIALISTS	HABITAT REQUIREMENTS
Field sparrow	Transitional Shrubland
Common yellow throat	Transitional Shrubland
Prairie warbler	Young Shrubland
Willow flycatcher	Young Shrubland
Yellow-breasted chat	Young Shrubland
White-eyed vireo	Young Shrubland
Blue-winged warbler	Young Shrubland
Yellow warbler	Young Shrubland
UBIQUITOUS SPECIES	
Brown thrasher	Young Shrubland
Eastern towhee	Young Shrubland
Blue grosbeak	Young Shrubland
MULTIPLE HABITAT SPECIES	
Northern bobwhite	Transitional Shrubland
Black-billed/Yellow-billed cuckoos	Older Shrubland
Whip-poor-will	Older Shrubland

The Vitz and Rodewald study (2007) results have shown that during the post breeding period, birds (especially red-eyed vireo, worm-eating warbler, ovenbird, hooded warbler, and scarlet tanager) seek out the structurally complex and low vegetation structure (greater than or equal to 4.5 m) that shrub and sapling habitats provide. These habitat factors showed the highest capture rates during migration, demonstrating their importance for seasonal frugivores. It was concluded that early successional stands have legitimate conservation value to mature forest-breeding birds as well as early successional breeding birds, as shrubland habitats promote their survival and improve post breeding season condition for migrants.

Strategies

See strategies listed under objective 4.2.

Objective 4.2 Grassland Bird Habitat Management

Manage for an interspersion of habitat structures for bird species that utilize grasslands during breeding as well as non-breeding seasons by maintaining a mixture of short, medium, and tall native grassland vegetation in areas of the refuge not well-suited to reforestation. This may be accomplished in varying amounts in rotation with shrubland and forest management. This will provide breeding habitats for northern bobwhite, northern harrier, and other obligate grassland nesting birds, and also provide migrating and wintering habitats for Canada geese, shorebird, and songbird species.

Specifically, manage 124 acres (50 hectares) or more of grasslands adjacent to salt marsh habitat to meet the needs of priority species that would be especially attracted to such a landscape context, such as breeding Henslow’s sparrows and wintering northern harriers.

- Habitat characteristics include patch sizes of no less than 75 acres (30 ha) in moderately tall grassy vegetation (greater than 30 cm) with a well-developed litter layer, woody species accounting for less than 10 percent habitat coverage, a forb component of about 25 percent, and less than 10 percent of non-native grasses or invasive plant species.

Rationale

Grassland birds are those birds that rely on grassland habitats include various species of waterfowl, raptors, shorebirds, upland gamebirds, and songbirds that require native grasslands for nesting and other habitat functions. We will use habitat generalizations to create a mosaic of grassland habitat conditions to provide quality food and cover resources for a wide spectrum of grassland nesting and wintering birds.

Grassland bird use will vary with the physical habitat structure, disturbance patterns, and other factors (table 4-4). For each bird species, these grassland habitats can provide protective cover for nesting and brood rearing activities in the spring and summer. They provide a diversity of native plants that produce important food items—mostly insects and other invertebrates that include grasshoppers, crickets, beetles, caterpillars, ants, katydid, dragonflies, cutworms, wasps, flies, spiders, snails, and sow bugs for nesting female birds and young. These habitats provide important raptor prey items like mice, voles, shrews, rabbits, groundhogs, snakes, lizards, songbirds, and other wildlife species, and provide food and cover resources for migrating and wintering Canada geese, northern bobwhite, black-bellied plover, sparrows, and other grassland-dependent bird species.

Table 4-4. Habitat preferences of some birds using grasslands

Species	Preferred Grassland Growth			Avoid Woody Vegetation
	Short	Medium	Tall	
Northern harrier			X	X
Barn owl	X	X	X	X
Short-eared owl		X		X
Northern bobwhite			X	
Willet	X	X		X
Canada goose	X	X		X
Horned lark	X			X
Sedge wren			X	
Black-bellied plover	X	X		X
Bobolink		X		X
Eastern meadowlark		X		
Vesper sparrow	X			
Savannah sparrow	X	X		
Grasshopper sparrow	X			
Dickcissel		X	X	
Henslow's sparrow		X	X	X

Although perpetual grassland maintenance is not a focal component of our habitat management program, we have the opportunity to meet the needs of several species of conservation concern. By focusing some grassland management in areas adjacent to high salt marsh, our efforts can target Henslow's sparrow as a priority species while also serving to umbrella habitat requirements for other grassland species, such as northern bobwhite and various species of waterfowl, raptors, shorebirds, upland gamebirds, and songbirds that need grassland habitats for nesting and other habitat functions. The Henslow's sparrow nests in the highest portion of high marsh zones within the marsh/upland ecotone. This habitat is often linear and characterized by stands of salt meadow hay interspersed with shrubs that grade into patches of switch grass. Availability of switch grass seems to be important to the distribution of these sparrows (Zimmerman 1988 and Smith 1992). Maintaining grassland habitats near high salt marsh areas will also benefit coastal plain swamp sparrow, short-eared owl, eastern meadowlarks, migrating savannah sparrow, vesper sparrow, grasshopper sparrow, willet, sedge wren, horned lark, northern harrier, black-bellied plover, and Canada geese. In addition to birds, species such as migrating and resident butterflies, frosted elfin, American burying beetle, eastern box turtle, milk snake, least shrew, and rare native plant species will benefit.

As with shrubland management, maintenance of grassland communities will require periodic disturbance, resulting in a range of seral stages over time or space. The result of this is a diversity of grassland structure (short, medium, tall) at any one time and in any particular place, each potentially serving the habitat needs of different suites of species.

Many of the refuge's upland fields proposed to be managed in accordance with objectives 4.1 and 4.2 have been part of the refuge's cooperative farming program. In the past, the primary objective of the farming program was to provide food for certain duck species (mallard, American black duck, northern pintail, and wood duck) and Canada geese during the fall, winter, and spring. A secondary objective of the farming program was duck production; croplands in

grass or clover stages of rotation were designed to provide nesting habitats for ducks. In recent years, duck species seldom or never used cropland field habitats due to plentiful wetland and aquatic habitats available on refuge marsh habitats. Sufficient natural foods are also produced to satisfy the needs of Canada geese in these habitats, especially if measures are taken to reduce snow goose numbers. Waterfowl production is no longer a management objective for Prime Hook NWR, so promoting early successional grass or clover to provide nesting cover is unnecessary. Finally, the elimination of farming on the refuge is consistent with recommendations in the Service's final EIS on the management of light geese (USFWS 2007a), which encourages refuges to reduce areas planted to agricultural crops that serve as a supplemental food source for overabundant greater snow geese. Managing a portion of these previously farmed acres as grassland and other transitional habitats better serves numerous refuge objectives.

Strategies for Objectives 4.1 and 4.2

- Implement field management prescriptions outlined in the HMP (appendix B).
- These proactively restored or naturally succeeding areas will occur as a shifting mosaic of patches across the refuge's landscape as we implement decisions to allow open fields to grow to shrub and young forest, maintain early successional grassland patches near salt marsh habitats, or retain field openings adjacent to upland mature forests.
- Increase shrubland and forested buffered areas (greater than 200 meters) adjacent to refuge creeks, depressional swamp and emergent wetland habitats, or restore prior converted wetlands for targeted species in both objectives 4.1 and 4.2.
- Use the USGS publication "Conceptual Ecological Model for Management of Breeding Shrubland birds in the mid-Atlantic Region" (Peterjohn 2006) as a guide to restore and maintain shrubland habitats.
- Develop rotational management action schemes for prescribed fire, mowing, application of herbicides, etc., to create and maintain habitat conditions specified in objectives 4.1 and 4.2; more information on optimal disturbance schedules for shrubland management and other best management practices is currently being reviewed by the regional shrubland management work group.
- Engage the public in outreach and education about the benefits of pollinators, instilling a greater appreciation for invertebrates and their essential links to BIDEH.

Monitoring Elements for Objectives 4.1 and 4.2

Conduct appropriate monitoring and survey programs as funding and staffing permit to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, or reevaluation or refinement of our objectives. Details of planned monitoring will be developed in a subsequent inventory and monitoring plan. Examples of monitoring or surveys that we may implement include:

- Prevent new invasive species from becoming established by utilizing early detection rapid response techniques that detect newly established invasive species, and immediately addresses those populations through the appropriate control measure. This approach will incorporate a combination of plant identification and inventories, maintaining updates of new invasive species present in the region, and knowing the appropriate management techniques prior to conducting control efforts.
- Develop monitoring protocols for targeted breeding and migratory birds dependent on early successional habitats.

- Conduct annual habitat condition assessments to determine what habitat management actions should be prescribed in annual habitat work plan.
- Develop GIS layers (e.g., RLGIS or similar) needed to document restoration and habitat management actions by field number, along with refuge management actions database to tract shifting mosaics of transitioning habitats.
- Explore the possibility of applying a current arthropod index of biological integrity for shrubland landscapes (Karr et al. 2003) and other shrubland metrics, in consultation with other refuges, as a standardized multi-metric index tool to assess the condition and restoration efforts of early successional upland habitats

Sea Level Rise and Climate Change Strategies and Monitoring

Sea level rise and climate change strategies are the same as those listed above and under objectives 2.1, 2.2, and 2.3.

GOAL 5:

Visitor Services

Provide visitors with a place to safely take part in the six priority wildlife-dependent recreational uses established by the Refuge Improvement Act, as well as other public uses as may be allowed without interfering with refuge purposes and objectives for wildlife.

Objective 5.1 Hunting

Provide a high-quality hunting program that is administratively efficient and used to maintain healthy habitats through the management of wildlife populations, where appropriate.

Rationale

Hunting on the Delmarva Peninsula is a traditional outdoor pastime and is deeply rooted in our American and Delaware heritage. Off-refuge opportunities for public hunting are decreasing with increasing private land development. Refuge lands have become increasingly important in the region as a place to engage in this activity. Hunting has and will continue to be an integral component of the public use program at the refuge engaged in by many visitors each year. When managed responsibly, this activity can instill a unique understanding and appreciation of wildlife, their behavior, and habitat needs, as well as their role in the surrounding environment. General hunting information can be found in Chapter 3, Existing Environment, Refuge Administration—Refuge Visitor Services Program.

Section 605 (FW 2) of the Service Manual states that hunting programs will be compatible, provide quality experiences, and to the extent practicable, be consistent with State fish and wildlife laws and regulations. After careful review and consideration, we have determined that the refuge's previous hunting program was inefficient and overly complex, requiring a significant amount of staff resources. A recently conducted regional visitor services review found the hunt program to be "out of balance with other priority refuge needs and services," such as habitat management, maintenance, and public use programs such as environmental education. Another finding from the review identified that "the amount of station resources going into this activity (hunting) seems to far exceed what is necessary to provide for a quality hunting program." The review also mentioned that the "care and maintenance of refuge blinds and tree stands....seems to put an undue burden on staffing resources." In other words, a major portion of refuge staff time and operating budget are currently devoted to the hunting program's fee-based permit system, the continued replacement and upkeep of over 100 permanent waterfowl blinds and elevated tree stands, and administration of all hunts and associated lotteries.

The opinions by the visiting public and community landowners were surveyed in 2004 and 2005 by USGS on behalf of the refuge (Sexton et al. 2007). About 35 percent of visitor respondents indicated that they hunted on the refuge and had been hunting there an average of 11 years. When asked about the importance of hunting activities, more than half of the responses rated it as moderately to very important, and most hunters (85 percent) feel the refuge provides a quality hunting experience. Dove hunting and upland game hunting appear much less important than other hunting activities, and hunting ducks and hunting deer with muzzleloader and shotgun were more important than other hunting activities.

In the survey, hunters were also asked about the desirability of changing some hunting services or regulations, but did not appear to be very interested in making changes. Most hunters seemed to prefer the refuge to maintain or improve the elevated tree stands, and the waterfowl blinds. The most desirable of the suggested changes was the provision of more areas where portable deer stands could be used as well as areas where individuals could set up their own waterfowl blinds. Some were only slightly interested in adding a preseason drawing for waterfowl hunting. Consumptive-use visitors asked to see increases in hunting and fishing areas and access.

Summary. To improve the refuge's hunting program, we developed this plan in collaboration with our State partners in the Delaware Division of Fish and Wildlife. These program changes, which reflect a diversity of hunting preferences and opportunities, strive to meet the guiding principles for a quality refuge hunting program identified in Service policy 605 FW 2. They also support Presidential Executive Order 13443: Facilitation of Hunting Heritage and Wildlife Conservation.

The hunting program has been adjusted to allow for more effective consumptive recreation opportunities along with an increase in opportunities for non-consumptive users to appreciate the refuge while avoiding conflicts with hunters. We will expand some aspects of the hunting program to include additional days and acres throughout the hunting seasons established by the state. Deer hunting acreage will increase from 4,020 to 5,221 acres, waterfowl hunting from 1,722 to 3,432 acres (which meets the 40 percent "inviolate sanctuary" rule), upland game and migratory bird hunting remains at 1,995 acres, and turkey hunting is added, from 0 to 3,729 acres. However, we will only issue no more than five turkey hunting permits, and the vast majority of the refuge will remain open to wildlife observation and other non-consumptive uses during the turkey hunting season. Furthermore, we are providing 3,185 acres of sanctuary area (no-disturbance areas) for waterfowl and other wildlife. Given the dominant role of the refuge in the Atlantic Flyway migration corridor, this closed area system was established to provide waterfowl with a network of resting and feeding areas and to disperse waterfowl hunting opportunities on the refuge. Specific descriptions of these sanctuary areas can be found later in this chapter 4 (under Waterfowl Hunting), but are roughly Unit II, the lower half of Unit III, and Unit IV (map 4-8).

Areas. Increases in proposed hunting acreages will provide new hunting opportunities from current management; however, many of these proposed "new" hunting areas are currently open to some type of hunting or were previously open either under refuge management or private ownership. For example, Unit I is currently open for deer and upland game hunting and is now proposed to be open for waterfowl hunting—same land, but with a new opportunity. The refuge lands currently closed to hunting and proposed to be open for any type of hunting that are not currently being hunted for any species includes: an area located north of Prime Hook Road commonly referred to as Oak Island (deer only), an area north of Route 16 referred to as the Millman Tract (deer and turkey), an expanded area of the existing Jefferson Lofland Area and Headquarters Area (deer and turkey), an expanded area of the Unit III waterfowl hunt area (waterfowl only), and an area west of Petersfield Ditch in Unit IV. Of these areas, Oak Island was previously hunted under refuge management up until 1995 and the Millman Tract

was hunted under private ownership up until the Service purchased it in 2001. The expanded areas of the Jefferson-Lofland Area, Headquarters Area, and nearly all of the proposed Unit III waterfowl hunt area were previously hunted under refuge management. No prior hunting of the area west of Petersfield Ditch is known.

Administration. Other changes to the hunting program will lower administrative burdens to staff resources and improve hunting quality. More specifically, these changes include:

- Eliminating permanent hunting structures.
- Allowing hunters to free roam in most areas that can tolerate pedestrians or navigation without adverse impacts on a first-come, first-served basis following State regulations.
- Adopting one-time seasonal permits for all hunting areas except lottery hunts.
- Enhancing youth and disabled hunting opportunities.
- Establishing seasonal closures to minimize wildlife disturbance and avoid conflicts with other uses.
- Establishing preseason lottery drawings for high demand deer, waterfowl, and turkey hunt areas.
- Eliminating daily standby permit drawings.
- Eliminating permit fees except for lottery hunts.

All persons hunting on the refuge will be required to obtain the necessary State licenses, tags, and stamps. Waterfowl hunters will be required to have a Federal migratory bird hunting and conservation stamp (duck stamp). Each hunter will also be required to have a signed copy of the current Prime Hook NWR hunting regulations leaflet, which will serve as the refuge hunting permit. In addition, hunters participating in the lottery hunts for deer, waterfowl, and turkey will also be required to have a daily permit issued in advance of the hunt date through a contractor. Hunters will not be required to check-in or check-out on the day of any hunt.

For most areas, hunter numbers will not be limited to a specific hunt location. Hunters will have the ability to free roam for deer, waterfowl, upland game, and turkey in designated areas on a first-come, first-served basis. Non-ambulatory hunters are allowed to hunt in all hunt zones in accordance with refuge policy and regulations. Only non-ambulatory hunters may hunt in the Island Farm Unit, where we have provided non-ambulatory hunt blinds to accommodate hunters with this need. For the Statewide youth hunts, all designated hunt areas will be open for waterfowl, deer, or turkey hunting on a first-come, first-served basis. We don't know the exact number of hunters who will participate in refuge hunting opportunities; however, we do anticipate a slight increase from current levels.

Lottery. Preseason lottery drawings are proposed for high demand areas, including the lottery deer hunt area (headquarters area), disabled deer and waterfowl hunt areas, lottery waterfowl hunting area (described previously in this section), and lottery turkey area to reduce hunter conflicts, lessen administration, and provide equal opportunity for all hunters. For daily drawings on opening days under current management, it is common to see more than 100 deer hunters

show up for 32 available shotgun hunting opportunities and 80 waterfowl hunting parties (with up to 3 people per party) show up for 25 to 27 available hunt blinds. This illustrates how inefficient and frustrating it is for a group of hunters to get up early in the morning when they have less than a one in three chance of getting a hunting spot. As a national wildlife refuge, Prime Hook NWR will provide hunting opportunities through these preseason drawings for local, in-State, and out-of-State hunters. Knowing in advance allows hunters to prepare, plan, and scout, which ultimately improves the quality of their hunting experience.

Preseason lottery drawings will be administered by a contracted company that will feature online and telephone services to collect hunter information and required fees (covered later in this section), and issue permits. These services will provide hunters with the ability to apply, pay for, and receive hunting permits in advance of the hunting dates. All fees must be paid prior to the issuance of a permit. Refuge staff will work with the contractor to provide the highest level of customer support.

For the preseason drawing for the lottery deer hunt area, hunters will be selected for a hunt date based on their date preferences. If selected, a limited number of hunters (no more than 30 hunters) will have access to the hunt area and may choose their hunting location on a first-come, first-served basis on the day of the hunt. For the lottery waterfowl hunt area and disabled deer and waterfowl hunt areas, hunters will be selected for a hunt date and hunting blind site based on their date preferences during the preseason drawing. Hunters could be picked for multiple dates. Only the first 2 days of each of the State's seasonal splits for waterfowl will be included in the preseason drawing for the disabled waterfowl area and will be first-come, first-serve thereafter. For the lottery waterfowl hunts, the selected hunter may take two additional people on that hunt day. Federal blind sites in addition to eight State blinds will be available each day. Everyone in the lottery drawing has an equal chance of being selected multiple times. The lottery turkey hunt may be administered by the Delaware Division of Fish and Wildlife.

For any vacant hunting opportunities not selected during the preseason lottery drawing, hunters will have the flexibility to go to the contractor's Web site at any time (24 hours a day) during the hunting season, view available hunt dates, and select and pay for these permits at any time. For those individuals who do not have computer access, customer representatives will be available by telephone during business hours on weekdays to assist. Hunters will be allowed to claim only one permit per day to prevent someone from claiming all available vacancies at one time. The licensing contractor will supply refuge staff with a list of permitted applicants. No daily standby lottery drawings will be conducted.

Deer stands and waterfowl blinds. Permanent hunting structures, such as deer hunting stands and duck hunting blinds, will be phased out over a 5-year period in all areas except the disabled hunting areas. We will limit the number of permits in the lottery hunt areas to minimize hunter conflict in areas historically known to attract large hunter numbers. In the case of deer hunting, the phasing out of permanent deer stands will require hunters to find a suitable hunting location within designated hunting areas through effective scouting. Use of portable deer climbing stands is recommended, but not required. In the case of waterfowl hunting, the phasing out of permanent waterfowl hunting blinds in the lottery hunt area will require hunters to provide their own means to camouflage themselves (boat blind, pop-up blind, etc.). Waterfowl hunters will be required to hunt within a defined area around a designated blind site (marker) in the lottery waterfowl hunt area. For any type of hunting, we feel that allowing hunters to scout and have the flexibility to adjust their hunting locations for weather

conditions enhances the quality of their hunt. Maintenance mowing will no longer occur to provide trails to facilitate deer hunting. Some conflict among hunters over desired hunting locations is expected and we will continue to encourage proper hunting ethics.

Visitor safety at refuges is a high priority when developing compatible wildlife-dependent recreation programs, such as hunting; however, it is ultimately the responsibility of every hunter to be safe. An accident involving hunter safety results from either a lack of hunting ethics or a violation of hunting regulations. Use of portable deer climbing stands will be recommended but not required. For hunters who may be unable to climb trees using portable deer stands or who may wish to hunt from permanent deer stands or duck blinds, the state-owned Prime Hook Wildlife Area, which adjacent to the refuge, will continue to provide these opportunities. There are many areas on the Delmarva Peninsula, other than Prime Hook NWR, that offer public hunting opportunities in free-roam areas or from designated permanent structures. Additional information about free roam hunting and the use of deer stands and duck blinds on the refuge and on the Delmarva Peninsula can be found in the visitor services section in chapter 3 or the hunting management plan in appendix C.

Disabled. The refuge's proposed action offers opportunities for all disabled individuals. Areas will be reestablished for non-ambulatory wheelchair users to ensure that these individuals have opportunities for quality hunting experiences. Wheelchair hunters often have limited mobility, and there are no or limited opportunities on the refuge to hunt unless refuge staff provides them with accessible infrastructure such as ground blinds and vehicular access. These hunters may not have the option to hunt other areas, as they are limited by the accessibility that the refuge provides them. Other disabled, yet ambulatory hunters are provided opportunities to hunt in the free roam areas, are not required in any fixed location, and may choose how far they are capable or willing to travel to hunt. Because these proposed changes do not exclude hunters with other types of disabilities from the refuge's hunting program, these methods are in compliance with the intent of the Americans with Disabilities Act.

Non-ambulatory hunters have commented about their frustration with the current hunting system. The number of non-ambulatory hunters on the refuge has decreased since 2005, when access was granted to all individuals with any permanent disability (not just non-ambulatory hunters) to hunt in the disabled hunting area along with additional hunting days. Hunter success rates for deer have also decreased from an average of 32 percent from 2000 to 2005 to an average of 18 percent from 2005 to present.

Youth hunting. The Service proposes to enhance youth hunting opportunities by collaborating with State partners and non-governmental hunting organizations to develop hunter training programs that instruct beginning hunters in the knowledge and skills necessary to become responsible, respected individuals who strive to learn all they can about the species being hunted and to become knowledgeable in firearms safety, hunter ethics and wildlife conservation. The Service will also develop mentored hunting programs for both youth and adults and offer programs developed by the National Archery in the Schools program (NASP) to encourage family participation in archery shooting. Portions of any area open to hunting may be used to facilitate these mentored hunts and these areas will be temporarily closed to the general hunting public during those times.

Season dates, bag limits, and harvest methods for the hunting program at Prime Hook NWR will be consistent with State and Federal hunting frameworks and regulations. However, restrictions to these frameworks are listed below in the strategies and refuge-specific regulations to minimize user conflicts, address natural resource impacts, reduce administrative complexity, and ensure a quality hunting experience. The refuge manager will evaluate and make necessary

adaptations to the hunting program to ensure that the refuge is meeting resource management objectives and continuing to offer quality experiences. Therefore, the refuge manager may extend or close hunting opportunities on the refuge within the established hunting seasons of the Delaware Division of Fish and Wildlife. The hunt program will apply to lands now a part of the refuge and lands added to the refuge in the future.

Additional information regarding the proposed hunting program can be found in the compatibility determination in appendix E, and in the hunting management plan in appendix C.

Strategies

- Continue to provide hunting opportunities for deer, waterfowl, upland game (rabbit, quail, pheasant) and webless migratory birds (mourning dove, snipe, and woodcock).
 - ✱ Continue to provide deer and waterfowl hunting opportunities for disabled hunters.
- Expand hunting opportunities for deer, waterfowl (including snow geese), upland game, webless migratory birds, and turkey (for details, refer to objectives 5.1a through 5.1d).
 - ✱ Support Presidential Executive Order 13443: Facilitation of Hunting Heritage and Wildlife Conservation.
 - ✱ Adopt all State of Delaware hunting seasons and regulations, except as restricted in refuge-specific regulations.
 - ✱ Provide additional hunting days and areas over current program.
 - ✱ Put seasonal closures in effect for some areas to minimize wildlife disturbance and avoid conflicts with other public recreational programs.
 - ✱ Provide high-quality hunting opportunities for turkey.
- Clearly sign all areas closed to hunting.
- Adopt a one-time issued seasonal permit except for lottery hunts.
 - ✱ Permit must be signed and in possession of hunter.
 - ✱ Permits are non-transferable.
- Remove all permit fees except for lottery hunts.
 - ✱ Adjust the fee schedule for the lottery deer hunt area, lottery waterfowl hunt area, disabled deer and waterfowl hunt areas, and lottery turkey hunt area.
- Increase the application fee for preseason lottery drawing to \$5/hunter.
- Require a processing fee of \$2 to \$3 per hunt for vacancies remaining after the preseason lottery drawing.
- Adjusted permit fees are as follows:
 - ✱ Deer and turkey—\$10 per daily permit (per blind for non-ambulatory disabled hunters; application and permit fees for turkey hunting may be waived if the lottery drawing is administered by the State).
 - ✱ Waterfowl—\$15 per daily permit per blind site.

- * The 50 percent discount on permit fees to interagency senior and access passholders does not apply.
- * Youth hunters age 15 years and younger must obtain a free seasonal permit. Only hunters aged 16 years and older can apply for or obtain a lottery hunt area permit.

Permit fees. The refuge collects boat ramp launching fees and hunting permit fees under the guidance of the Federal Lands Recreation Enhancement Act, 16 U.S.C. 6803(c), Consolidated Appropriations Act (PL 108-447). This law grants the Secretary authority to collect recreation fee revenues for public recreation. The Recreation Enhancement Act provides for a nationally consistent interagency program, additional on-the-ground improvements to visitor services sites across the nation, a new national pass for use across interagency Federal recreational sites and services, and more public involvement in the program. The act replaces the Recreation Fee Demonstration Program and authorizes the Recreation Fee Program for 10 years through 2014. At least 80 percent of the funds raised from user fees on a particular refuge in this region stay at the refuge and are used to enhance visitor services and reduce the backlog of maintenance needs for recreation facilities. Recreation fees may not be used to pay for biological monitoring on Federal recreational lands and waters under the Endangered Species Act of 1973, for listed or candidate species or to pay for employee bonuses. The remaining 20 percent is sent to the region to be distributed to other refuges. In previous years, the refuge has received money from these regional funds for visitor services (appendix I).

This reduces the administrative burden and minimizes the amount of staffing resources needed to conduct the hunt by 54 staff days and \$17,890. The benefit to the hunter is a reduction in the cost to hunt. Therefore, the refuge proposes to eliminate permit fees to hunt on the refuge except for the lottery hunts (see chapter 3 for discussion of fees in the current hunting program).

Fees will be required to manage the lottery hunts for deer, waterfowl, and turkey. Application and permit fees for turkey hunting may be waived if the lottery drawing is administered by the State. The Refuge Recreation Act requires that funds be available for the development, operation, and maintenance of the permitted forms of recreation. The proposed permit fee (\$10 for deer and turkey, \$15 for waterfowl), preseason application fee (\$5/hunter), and processing fee for permits acquired after the preseason drawing (\$2 to \$3 per hunt) are the minimal amounts needed to offset the cost of facilitating the preseason drawings and managing the lottery hunts. Due to the uncertainty in the level of hunter participation with these new program changes, permit fees may need to be adjusted (increased or decreased), and therefore will be evaluated during the first 5 years of the CCP. Preseason lottery drawings will be administered by a contracted company that will collect information and required fees, conduct the drawing, and issue the permits. This may reduce our costs by more than \$3,000 and application and processing fees will be paid to the contractors for administering this permitting process. Refuge staff will work with the contractor to provide the highest level of customer support. Signs for posting hunting areas, trails, etc., will have an initial, one-time cost.

- Provide lottery hunts in the lottery waterfowl hunt area, lottery deer hunt area, disabled deer and waterfowl hunt areas, and lottery turkey hunt area. See discussion earlier in this section or objectives 5.1a, 5.1b, or 5.1d for more information.
- * Conduct a preseason drawing to issue permits and collect fees for all available hunting dates. Drawings will be administered by a contracted company that will collect information and required fees, conduct the

drawing, and issue the permits. Hunting opportunities for these lottery hunts will be available to hunters through the preseason drawing and throughout the season by going to the contractor's website or calling a customer service representative. For vacant hunting opportunities after the preseason drawing, hunters will be allowed to claim only one permit per day to avoid someone from claiming all available vacancies at one time. Hunters will have the option to forfeit their permit to the contractor if circumstances prevented them from hunting on that day, without compensation, i.e. no refunds, to make their reservation available to other hunters.

- * Permits are non-transferable. No daily standby drawings will be conducted.
- * Permit and application fees apply.
- * Preseason drawings for turkey hunting may be conducted by the Delaware Division of Fish and Wildlife and if so, application and permit fees may be waived.
- Enhance disabled hunting opportunities, particularly for non-ambulatory wheelchair users (see objectives 5.1a and 5.1b for more information).
- Enhance youth hunting opportunities:
 - * Collaborate with State partners and non-governmental hunting organizations to develop hunter training programs that instruct beginning hunters in the knowledge and skills necessary to become responsible, respected individuals who strive to learn all they can about the species being hunted and to become knowledgeable in firearms safety, hunter ethics and wildlife conservation.
 - * Develop mentored hunting programs for both youth and adults and offer programs developed by NASP to encourage family participation in archery shooting.
 - * Portions of any area open to hunting may be used to facilitate these mentored hunts and these areas will be temporarily closed to the general hunting public during those times.
- Seasonal closures apply to non-consumptive users during the hunting season, which is typically a slower period of use due to weather conditions, and are highlighted below:
 - * Deep Branch Road Trail (includes Goose and Flaxhole Ponds; Unit III), Eastern Prime Hook Creek (from Foord's Landing to headquarter ramp) (Unit III), and hiking trail on Fowler Beach Road (southside of Unit II): Closed every day from September 1 through March 15. Additional seasonal closures may apply through the second Saturday in May for hunting during the snow goose conservation order or turkey hunting. If and when the photography blind is available on the southside of Fowler Beach Road, this portion of the trail will be open year round and open every Sunday during the hunting season.
 - * Headquarters area (includes Turkle and Fleetwood Ponds) (Unit III): Closed only for a maximum of two days for deer hunts and portions may be closed for turkey hunts.
 - * Island Farm Area in Unit IV (includes trail overlooking Vergie's Pond): Closed from the Monday before Thanksgiving through March 15. Additional seasonal closures may apply through the second Saturday in May for hunting during the snow goose conservation order.

- ✱ Hiking trails on Fowler Beach Road (Unit I), Prime Hook Road (Unit III), and Slaughter Beach Road and Slaughter Canal (Unit I): Open only on Sundays from September 1 through the deer and waterfowl hunting seasons, which typically end in February. Additional seasonal closures may apply through the second Saturday in May for hunting during the snow goose conservation order or turkey hunting.
- Add a new full-time law enforcement officer to enforce regulations.
- Improve access at boat launching areas.
 - ✱ Enhance boat ramp access on Fowler Beach Road for access to Slaughter Canal.
 - ✱ Work with private landowners to improve access to western end of Prime Hook Creek.
 - ✱ Within 5 years of the plan, open a boat ramp for access to Prime Hook Creek at Foord's Landing.
- Enforce general regulations for all hunting programs
 - ✱ Hunters may not be on the refuge any earlier than two hours before shooting time.
 - ✱ The refuge will follow all State youth hunting requirements.
 - ✱ No vegetation may be cut on the refuge for shooting lanes, camouflaging, etc.
 - ✱ The use of natural vegetation for camouflaging a blind is prohibited.
 - ✱ Practice or target shooting on the refuge is prohibited.
 - ✱ Hunting blinds/stands must be portable and removed at the end of each day.
 - ✱ No hunting is permitted in designated safety zones.
 - ✱ Non-toxic shot is required for all hunting except lead slugs are permitted for deer or fox hunting.
 - ✱ Individuals assisting non-ambulatory disabled deer hunters are not permitted to hunt; however, up to two individuals may hunt while assisting a non-ambulatory disabled waterfowl hunter. Wheelchair hunters are required to have an assistant.
 - ✱ Designate Slaughter Canal as a slow no wake zone.
 - ✱ Digging for any reason is prohibited.
 - ✱ The refuge manager will monitor, evaluate, and make necessary adaptations to the hunting program to ensure that the refuge is meeting resource management objectives and continuing to offer quality experiences. The refuge manager has the authority to extend or close hunting opportunities on the refuge within the established hunting seasons of the Delaware Division of Fish and Wildlife, while ensuring compatibility.

Objective 5.1a White-Tailed Deer Hunting

Provide high-quality hunting opportunities for white-tailed deer.

Rationale

In addition to being a traditional outdoor pastime, deer hunting aids Statewide efforts to control deer populations and complements habitat management on the refuge. We intend to consult with the Delaware Division of Fish and Wildlife to maintain the deer population at a level commensurate with available habitat, to maintain the health of the herd and prevent the habitat degradation that accompanies overpopulation.

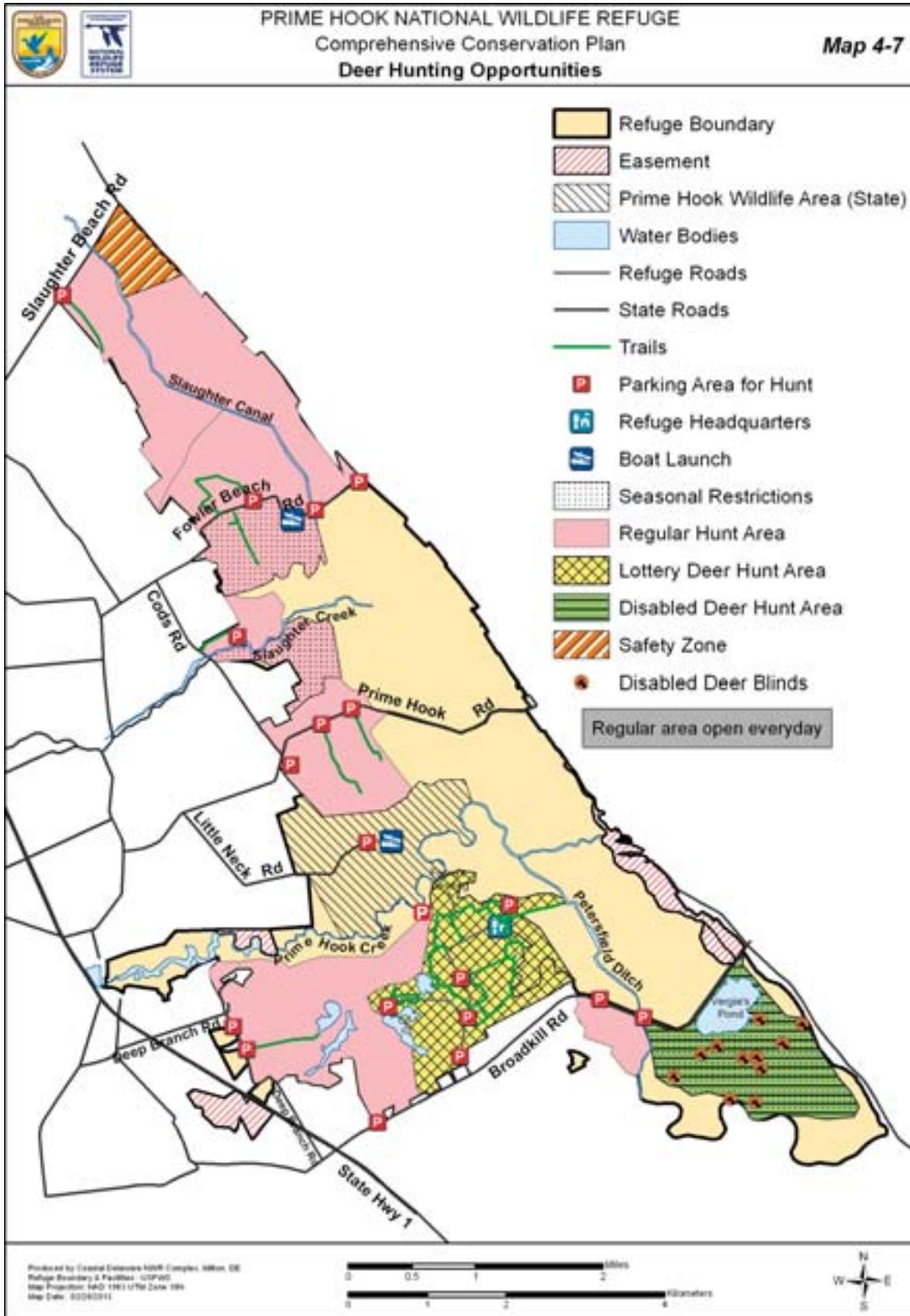
In addition to the information presented under objective 5.1, deer hunting will be increased to include an additional 1,201 acres beyond current management for a total of 5,221 acres. We will open these acres for archery (to include the use of crossbows), muzzleloader, or shotgun (to include the use of handguns) hunting, where appropriate, and will phase out permanent deer stands. Seasonal closures will occur not only to protect wildlife, but also to minimize conflicts between different hunting activities and other non-consumptive recreational uses (e.g., minimize conflict with anglers on Prime Hook Creek and close hunting in late November in designated areas to minimize bald eagle and waterfowl disturbance). Non-ambulatory hunters are allowed to hunt in all hunt zones in accordance with refuge policy and regulations. Only non-ambulatory hunters may hunt in the Island Farm Unit, where we have provided non-ambulatory hunt blinds to accommodate hunters with this need. Map 4-7 depicts deer hunting opportunities and infrastructure.

Strategies

In addition to objective 5.1 strategies:

- The refuge will continue to participate in all State hunting seasons and bag limits except the October antlerless deer season and January handgun season. State hunting seasons and harvest limits for deer are based on guidelines found in the Delaware Deer Management Plan 2010 to 2019 (Rogerson 2010), written by the Delaware Division of Fish and Wildlife.
- ✱ The refuge will consider participating in the October antlerless season if the refuge can provide a quality hunting experience, if an overabundance of deer arises as determined by the Delaware Division of Fish and Wildlife and concurrence by the refuge, and potential conflicts are minimized with other user groups.
- The refuge will participate in the Statewide youth deer hunt.
- The driving or pushing of deer is prohibited on the refuge.
- Hunting will be on a first-come, first-served basis except for lottery hunts.
- Check in and check out by hunters will not be required for any deer hunt.
- Expand deer hunting opportunities from 4,020 acres to 5,221 acres, an increase of 1,201 acres (map 4-7).
 - ✱ The refuge has adopted State hunting regulations and seasons for the regular deer hunt area with the following restrictions:
 - ✱ No access by boat from Slaughter Creek on Cods Road
 - ✱ There is no infrastructure to support boat launching.

Map 4-7. Deer Hunting Opportunities



- ✱ Seasonal closures to deer hunting from the Monday before Thanksgiving through March 15 will occur on the designated area north of Prime Hook Beach Road (Oak Island) and south of Fowler Beach Road to minimize disturbance to waterfowl and nesting bald eagles. The disabled deer hunt area in the Island Farm will be closed following the November shotgun season to minimize wildlife disturbance.
- Phase out permanent deer hunting stands over a 5-year period or when they become unsafe, whichever comes first.
 - ✱ Hunters may free roam in hunting areas except in the disabled deer hunt area.
 - ✱ Portable stands are permitted.
 - ✱ Eliminate maintenance mowing except for disabled hunt areas.
- Hunters will not be required to report their harvest data to the refuge. Refuge staff will collect harvest information from the existing reporting system administered by the State Delaware Division of Fish and Wildlife.
- Enhance hunting opportunities for individuals with disabilities, particularly for non-ambulatory wheelchair users.
 - ✱ Reestablish areas for non-ambulatory wheelchair users in a designated area in Unit IV.
 - ✱ Provide a limited number of hunting days during the early muzzleloader hunting season, the Statewide non-ambulatory hunt in November, and the early shotgun hunting seasons in the disabled hunt area to minimize deer disturbance and maximize quality hunting experience. A total of 11 ground blinds are currently available and required. Additional sites in this area may be provided.
 - ✱ The refuge may evaluate the regular deer hunting area for the potential to incorporate hunting opportunities for non-ambulatory hunters.
- Provide lottery hunts in the lottery deer hunt area and the disabled deer hunt area for a limited number of days during the firearms deer hunting seasons.
 - ✱ A limited number of permits (no more than 30 for the lottery deer hunt area) will be issued for each hunt day to reduce conflict and maintain quality hunting experiences.
 - ✱ Hunters may hunt anywhere within the lottery deer hunt area on a first-come, first-served basis. Hunters in the disabled deer hunt area must hunt from 1 of 11 ground blinds in the area.
 - ✱ The areas will be gated to minimize conflict with the general public and times will be designated for ingress and egress to the area.
 - The refuge will participate in the Statewide non-ambulatory deer hunt. The lottery deer hunt area will not be open for this hunt.
 - General regulations for deer hunting.
 - ✱ Enhanced opportunities for scouting will be allowed 2 weeks before the start of archery season and throughout the deer hunting season.

- * Hunters must be out of the hunting areas one and one-half hours after the evening shooting time.

Objective 5.1b Waterfowl Hunting

Provide high-quality hunting opportunities for waterfowl.

Rationale

In addition to the information presented under objective 5.1, waterfowl hunting will be increased to include an additional 1,710 acres from current management for a total of 3,432 acres. Seasonal closures will occur to protect wildlife and minimize conflicts between different hunting activities or other non-consumptive recreational uses (e.g., close hunting in late November in designated areas to minimize bald eagle and waterfowl disturbance). We will phase-out permanent waterfowl hunting blinds. In all hunt areas, hunting is proposed to remain at 4 days per week and to cease at 3 p.m. to minimize wildlife disturbance and provide quality hunting experiences. Non-ambulatory hunters are allowed to hunt in all hunt zones in accordance with refuge policy and regulations. Only non-ambulatory hunters may hunt in the Island Farm Unit, where we have provided non-ambulatory hunt blinds to accommodate hunters with this need.

The addition of new free-roam waterfowl hunting areas in salt marsh habitats in Unit I will provide quality opportunities, particularly when refuge impoundments freeze. Sanctuaries totaling 3,185 acres are provided as disturbance free areas for wildlife where no recreational activity is permitted. Map 4-8 depicts waterfowl hunting opportunities and infrastructure. In the lottery waterfowl area, the Service limits the number of hunting parties through the use of designated blind sites. In free-roam areas, hunters are limited by the available access for parking and boat launching and by hunters thinning themselves out as a way to minimize conflict with other hunting parties.

Strategies

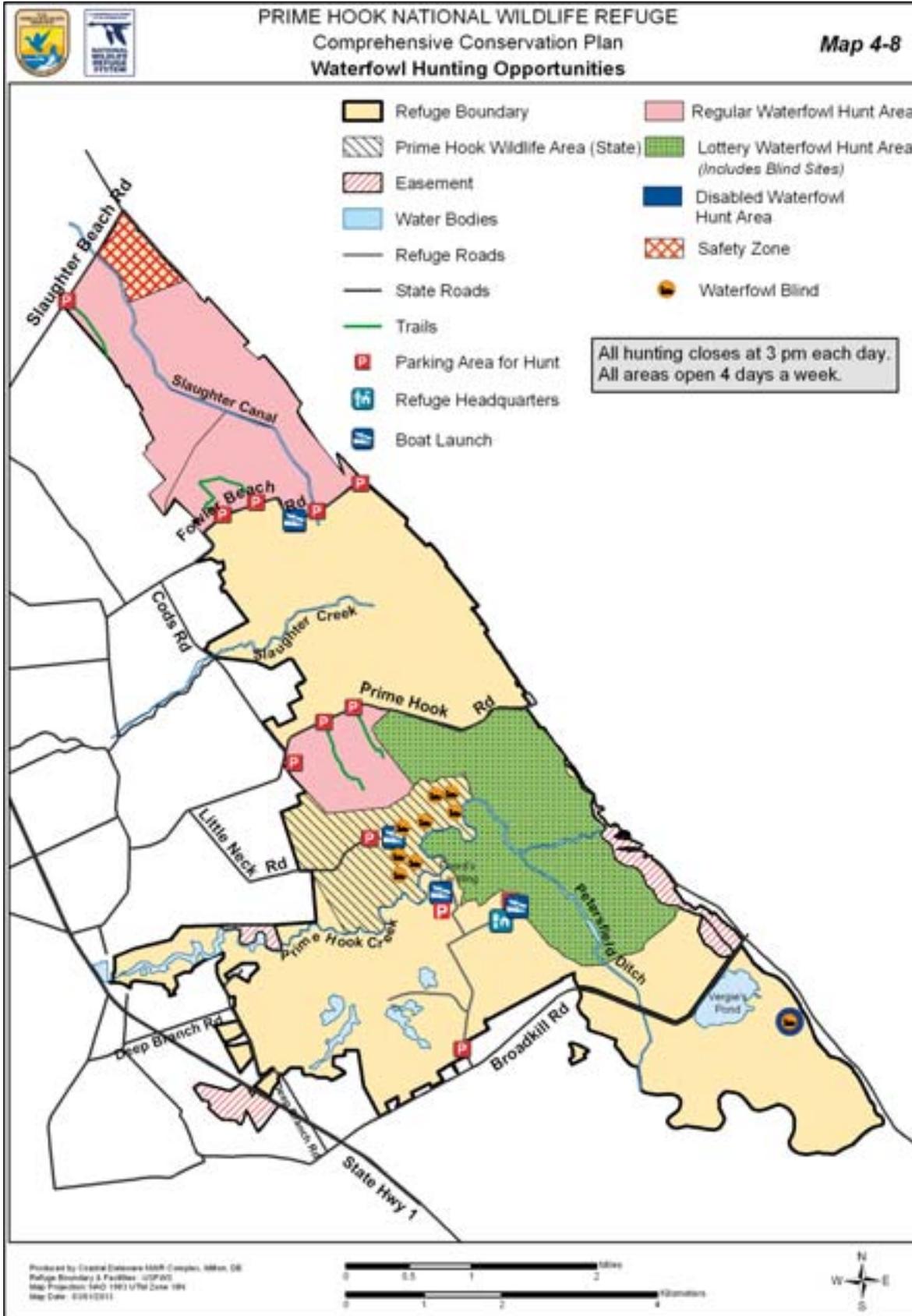
In addition to objective 5.1 strategies:

- Create waterfowl sanctuaries (disturbance free areas) in Unit II (approximately 1,800 acres), Unit III (approximately 390 acres), and Unit IV (approximately 995 acres)
 - * The Unit II impoundment area will be closed annually to all public use.
 - * Except for the disabled waterfowl hunt area (approximately 25 acres), most of Unit IV will be closed from the Monday before Thanksgiving through March 15 to all public use.
 - * Additional seasonal closures may apply through the second Saturday in May for hunting during the snow goose conservation order or for wild turkey.

To support waterfowl conservation efforts, the refuge has designated about 3,185 acres as waterfowl sanctuaries that will be closed to hunting and other recreational use on a seasonal or annual basis. These sanctuaries lie in Unit II (1,800 acres), the southern half of Unit III (390 acres), and most of Unit IV (995 acres) and provide resting and feeding habitat for waterfowl to concentrate rather than dispersing throughout the refuge. These sanctuaries function to provide migrating waterfowl with a more balanced and effective network of feeding and resting areas, to minimize disturbance to feeding and resting waterfowl, and to provide waterfowl hunters with more equitable hunting opportunities throughout the refuge.

- Establish hunter spacing limits
 - * Reduce hunter competition and improve hunting quality

Map 4-8. Waterfowl Hunting Opportunities



- Managed hunts in the lottery waterfowl hunt area will provide opportunities for a limited number of hunters and allow them to choose their hunting location
- Expanded hunting areas will provide greater opportunity for hunters
- Expand hunting opportunities from 1,722 acres to 3,432 acres or 40 percent of the refuge to include new hunting opportunities in Unit I and III. We must follow the guidelines of the 40 percent rule. All areas approved for purchase by the Migratory Bird Conservation Commission prior to 1978 are inviolate sanctuaries and thus subject to the 40 percent limitation, meaning only 40 percent of the area or areas can be open to migratory bird hunting. In 1978, the Fish and Wildlife Improvement Act amended Section 6 of the Refuge Administration Act of 1966 “to provide the opening of all or any portion of an inviolate sanctuary to the taking of migratory birds if the taking is determined to be beneficial to the species.” In addition, the act amended Section 5 of the Migratory Bird Conservation Act to include the provision that areas could be acquired for other management purposes.
 - * The refuge has adopted State hunting regulations and seasons with the following restrictions:
 - * Hunting will be on a first-come, first-served basis that includes jump shooting (except for lottery hunts and disabled hunts).
 - * In all waterfowl hunting areas, hunting is permitted four days per week until 3pm during the state waterfowl hunting seasons (except everyday during the snow goose conservation order).
 - * Check-in and check-out by hunters will not be required for any waterfowl hunt.
- Phase-out permanent waterfowl hunting blinds over a 5-year period or when they become unsafe; whichever comes first.
 - * Hunters may free roam in the regular waterfowl hunting areas (except the lottery waterfowl hunt area and disabled waterfowl hunt area).
 - * Hunters will be required to hunt from hunting blind site areas in the lottery waterfowl hunt area and disabled waterfowl hunt area.
 - * Blind site areas are subject to change due to changing habitat conditions, to improve the quality of hunting, or for safety considerations.
- Hunters will not be required to report their harvest data to the refuge. Harvest information will be collected through the harvest information program system.
- Enhance hunting opportunities for individuals with disabilities, particularly for non-ambulatory wheelchair users.
 - * Reestablish areas for nonambulatory wheelchair hunters permanently in a designated area in Unit IV.
 - * One disabled, wheelchair accessible, and camouflaged waterfowl hunting blind is available.
- Provide lottery hunts in the lottery waterfowl hunt area and disabled waterfowl hunt area.
 - * Through a preseason lottery drawing, hunters must choose their hunt dates and blind site locations from among the designated blind locations.

- * Only the first two days of each of the state's seasonal hunting splits for waterfowl will be included in the preseason drawing for the disabled waterfowl area and will be first-come, first-serve thereafter.
- * Within 5 years of CCP signing, we will open boat ramp access at Foord's Landing for all public recreational access.
- The refuge will participate in all State of Delaware waterfowl hunting seasons unless otherwise restricted. This includes the duck seasons, early teal season, youth waterfowl hunts, resident Canada goose season, and snow goose season (early and snow goose conservation order).
 - * Provide hunting opportunities during the resident Canada goose season and the early teal season in all areas designated as open to waterfowl hunting. In the lottery waterfowl hunt area, all regulations apply as stated in earlier strategies of this objective, except hunting will be on a first-come, first-serve basis and no preseason drawing will occur. In the regular waterfowl area, all regulations apply as stated in earlier strategies of this objective.
 - * Institute lethal snow goose control and provide hunting opportunities during the State of Delaware's snow goose conservation order season in all four management units throughout the refuge on a first-come, first-served basis everyday of the season during legal shooting hours.
 - * The light goose conservation order is an action implemented under the final environmental impact statement on the management of light geese (USFWS 2007a) to help reduce overabundant greater snow goose populations. Although the refuge has been closed recently to late snow goose hunting, the conservation order presents an opportunity to reopen to snow goose hunting during the late season in coordination with the State Delaware Division of Fish and Wildlife. This will be pursued as an option whenever the conservation order is in effect. All special harvest methods permitted by the conservation order apply.
 - * Hunting is not permitted in upland areas.
 - * The youth hunts will occur in all designated hunting areas on a first-come, first-served basis.
 - * In the lottery hunt area and disabled waterfowl hunt area, snow geese may only be taken when already open for duck hunting or during the snow goose conservation order.
- General information for waterfowl hunting
 - * Enhanced opportunities for scouting will be allowed on Sundays immediately prior to each of the duck season splits.
 - * Hunters must be out of the hunting areas by 4 p.m.

Objective 5.1c Upland Game and Webless Migratory Bird Hunting

Provide high-quality hunting opportunities for upland game (rabbit, quail, pheasant, and red fox) and webless migratory birds (mourning dove, snipe, and woodcock).

Rationale

In addition to the information presented under objective 5.1, upland game and webless migratory bird hunting will remain the same at 1,995 acres. However, the dove hunting acres will be decreased by 110 acres. The hunting of red fox will assist State management efforts in reducing the incidence of mange outbreaks to maintain a healthy population and reduce the predatory impact of this species

on migrating and breeding birds, particularly State and federally endangered or threatened species. Map 4-9 depicts upland game and webless migratory bird hunting opportunities and infrastructure.

Strategies

In addition to objective 5.1 strategies:

- Continue upland game and webless migratory bird hunting opportunities on 1,995 acres (110 of the total acres will not be open to dove hunting). See objective 5.1b for explanation of 40 percent migratory bird hunting rule.
- ✱ The refuge has adopted State hunting regulations and seasons for the upland game hunting area with the following restrictions:
 - * Provide new hunting opportunities for red fox.
 - ❖ Hunting of red fox is permitted only when concurrently hunting deer and is only permitted in areas open to deer hunting.
 - ❖ Chase hunting is prohibited.
 - ❖ Rimfire or centerfire rifles are prohibited.
 - * Dove hunting is open in the upland game hunting area except the designated area north of Prime Hook Beach Road.
 - * Squirrel hunting is prohibited due to presence of the endangered Delmarva fox squirrel on the refuge.
 - * Hunters will not be required to report their harvest data to the refuge.
 - * Hunting will be on a first-come, first-served basis. Check-in and check-out by hunters will not be required for any upland game and webless migratory bird hunt.
 - ❖ Hunters must be out of the hunting areas one-half hour after legal shooting hours.

Objective 5.1d Wild Turkey Hunting

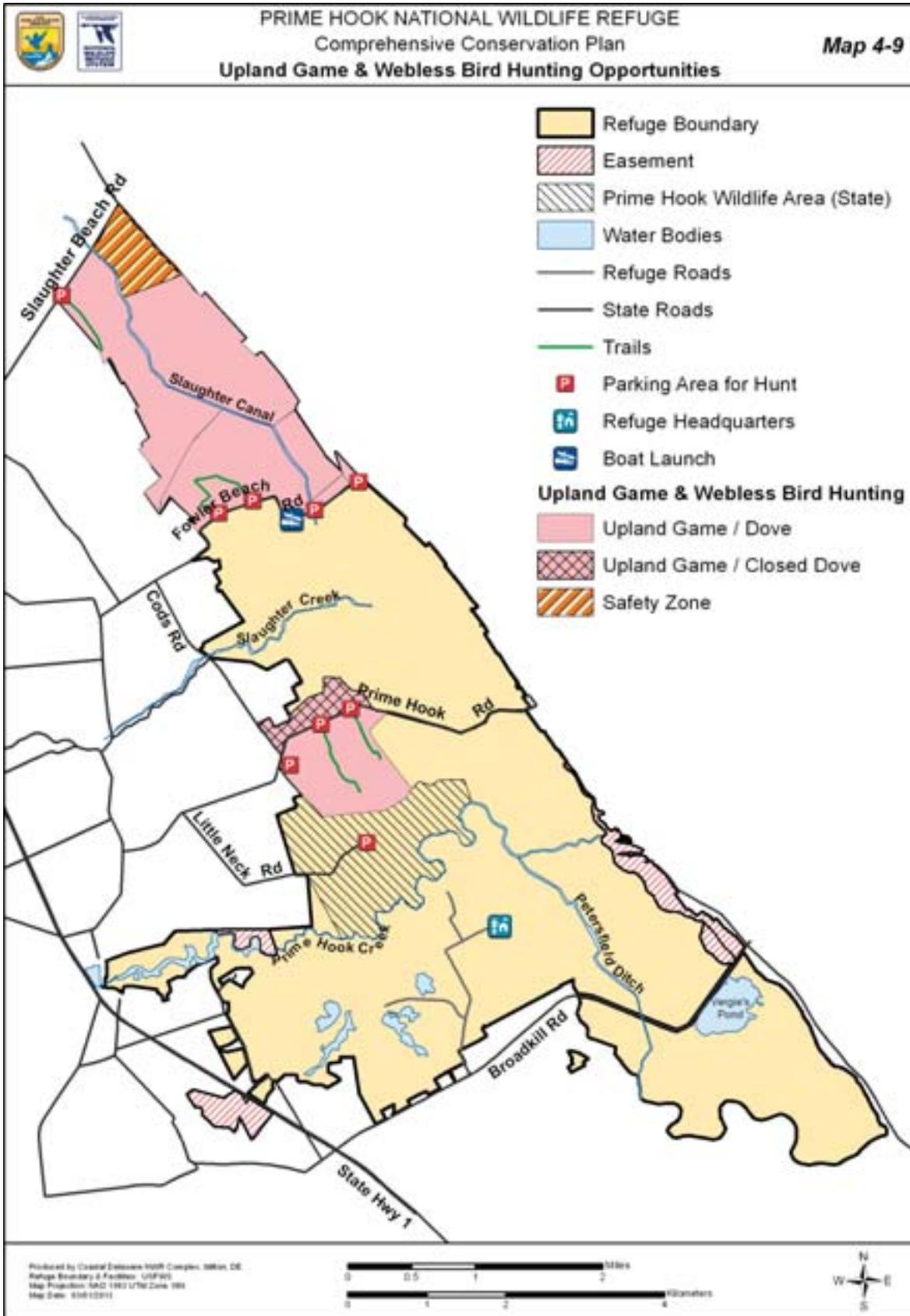
Provide high-quality hunting opportunities for turkey.

Rationale

Wild turkey is a resident game species that is managed by DNREC's Division of Fish and Wildlife. Prime Hook NWR falls within Zone 9 of DNREC's Wild Turkey Management Regions. Zone 9, which includes the state-owned Prime Hook Wildlife Area that is adjacent to the refuge, is currently open during the spring turkey hunting season. To ensure a sustainable harvest of the state's turkey population, DNREC biologists track their health, distribution and reproductive success. Current efforts include a volunteer-based survey used to generate an index of annual turkey productivity and recruitment, monitoring turkey harvest and hunter efforts, tracking turkeys with radio transmitters to evaluate their reproductive ecology, habitat use, and survival, and evaluating the genetic diversity of turkeys.

We will provide new opportunities for hunting wild turkey on 3,729 acres for a limited number of hunters. We recognize turkey hunting as a traditional outdoor pastime. When managed responsibly, it can instill a unique appreciation of wildlife, their behavior, and their habitat needs. Turkey hunting was initiated on the refuge in 1993. After two seasons of hunting and only one harvested turkey, the opportunity was discontinued. In recent years, hunter and staff

Map 4-9. Upland Game and Webless Bird Hunting Opportunities



observations indicate that a huntable population of turkeys may exist on the refuge, particularly in the headquarters area and in areas near Deep Branch Road. Limited opportunities exist on public lands to hunt turkey and the refuge may contribute to providing additional opportunities. Seasonal closures and time and space zoning among user groups may change on an annual basis to adapt to changing State of Delaware hunting seasons, Federal or State regulations, user conflicts, or impacts to natural resources. Map 4-10 depicts turkey hunting opportunities and infrastructure.

Strategies

In addition to objective 5.1 strategies:

- Collaborate with the Delaware Division of Fish and Wildlife to evaluate the status of the wild turkey population on the refuge. Hunting will be permitted if State and refuge personnel determine that the turkey population in the area is sufficient to support hunting on the refuge.
 - * Consult with the Delaware Division of Fish and Wildlife on an annual basis to determine the status of the turkey population and whether to allow turkey hunting on the refuge.
- Hunting of turkey will be permitted to a limited number of hunters (no more than five) in the designated lottery turkey hunt area in accordance with State hunting regulations and seasons.
 - * Provide lottery hunts in the lottery turkey hunt area, which may be administered by the Delaware Division of Fish and Wildlife and if so, application and permit fees may be waived.
 - * Conduct a preseason lottery drawing. No daily standby drawings will be conducted.
 - * During hunts, all public access will be closed in designated hunt areas during legal hunting hours.
 - * Participate in the statewide youth/non-ambulatory disabled turkey hunt.
 - * The number of permitted hunters may be adjusted (increased or decreased) based on changes in turkey population data.
 - * Enhanced opportunities for scouting will be allowed during designated dates and times.

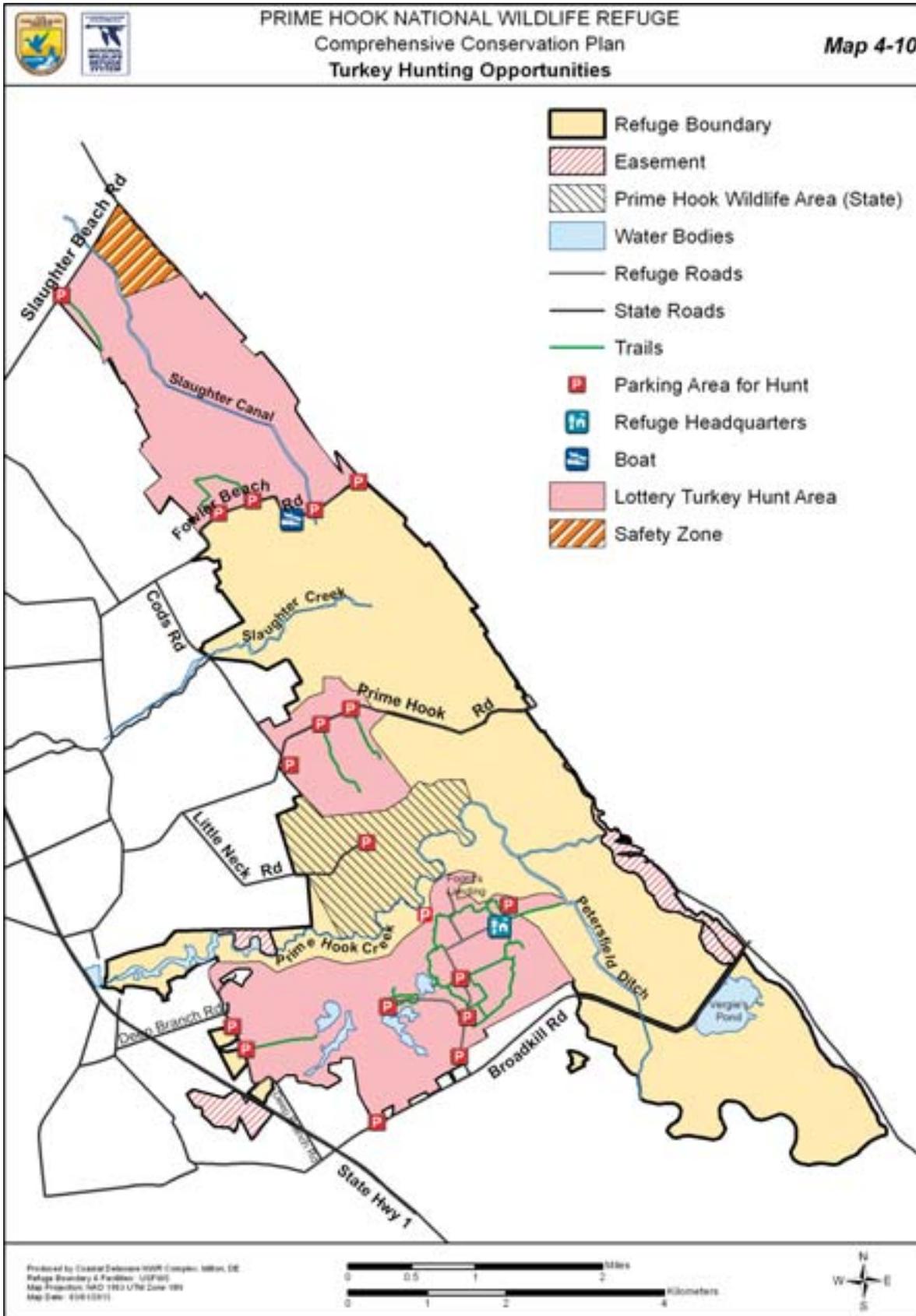
Objective 5.2 Wildlife Observation and Photography

Provide high-quality wildlife observation and photography opportunities.

Rationale

Wildlife observation constitutes the majority of the use on the refuge throughout the year, with refuge staff estimating that 90 percent of visitors engage in this activity. Wildlife observation is the primary reason both visitor and community residents visit the refuge, as indicated by the survey conducted on behalf of the Service (Sexton et al. 2007). The survey also found that being in a natural, undeveloped area and experiencing a serene environment are equally important to the refuge experience as are the trails that afford this opportunity (Sexton et al. 2007). Both visitors and community residents (consumptive and non-consumptive users) appear satisfied with the level of services or features currently offered by the refuge; however, a number of respondents indicated that they would like to see increases or improvements in wildlife viewing opportunities, environmental education, interpretive exhibits, and hiking or nature trails (Sexton et al. 2007).

Map 4-10. Turkey Hunting Opportunities



To improve the refuge's wildlife observation and photography program, we evaluated wildlife observation and photography on the refuge, incorporated the opinions of birders, nature photographers, hikers, etc., and developed this plan in collaboration with our State partners in the Delaware Division of Fish and Wildlife. These program changes, which reflect a diversity of preferences and opportunities for wildlife observation and photography, strive to meet the guiding principles for a quality refuge wildlife observation and photography program identified in Service policy 605 FW 4 and 5. They also support the Refuge System Improvement Act of 1997, which identifies wildlife observation and photography as priority wildlife-dependent recreational opportunities that should be offered on refuges when deemed to be compatible.

Maintaining quality infrastructure and providing new facilities will enhance visitor opportunities to view the relationships among resource management, wildlife, habitat, and people. Opportunities for wildlife observation and photography have been expanded to include seven new trails totaling 3.7 miles throughout the refuge in all four management units on existing maintained trails or interior refuge roads, bringing the total number of trails to 14 and 9.9 miles. Other expanded opportunities include the developing interpretive material highlighting wildlife viewing and photography areas along adjacent State roads, improvements to roadside viewing areas along Prime Hook Beach Road and Broadkill Beach Road, constructing a photography blind along a restored wetland area, and enhancing opportunities for disabled individuals.

We will impose limited seasonal closures in areas of the refuge that provide opportunities for wildlife observation and photography. One new closure will be the closure of the eastern portion of Prime Hook Creek from September 1 through March 15. We will continue to allow year-round access to the western 4 miles of Prime Hook Creek for visitors engaged in uses such as wildlife observation, wildlife photography, and fishing. Additional seasonal closures may apply until the second Saturday in May for hunting during the snow goose conservation order or turkey hunting.

At first glance, these seasonal closures give the appearance that opportunities for wildlife observation and photography are being significantly reduced or totally eliminated for over eight months during the proposed expanded hunting activities. To the contrary, the majority of the refuge will remain open to wildlife observation and other non-consumptive uses and provide more opportunities and open areas than under current management. The headquarters area remains available 363 days a year for non-consumptive uses, but portions may be closed for turkey hunting. All other areas except for the Deep Branch Trail, Fowler Beach Road trail (southside), and Prime Hook Creek are open on every Sunday during the hunting seasons. The Deep Branch Trail, the Fowler Beach Road trail (southside), and Prime Hook Creek are open with seasonal closures of every day from September 1 through March 15 and if necessary during the snow goose conservation order or turkey hunting seasons. If and when the photography blind is available on the southside of Fowler Beach Road, this portion of the trail will be open year-round and open every Sunday during the hunting season. The majority of the hunting will occur during the main hunting season, which typically runs for five months from September through January, with additional hunting opportunities for rabbit through the end of February. The actual season length, including starting and ending dates, will vary annually, and the actual number of huntable days will vary annually as well. For example, the Federal framework only permits a maximum of 60 days hunted during the waterfowl season, but because of additional restrictions imposed by the refuge (e.g., only allowing waterfowl hunting 4 days a week rather than 6 days a week), the regular duck season on the refuge will actually be approximately 40 days, and only to 3 p.m. on those days. Hunting during the snow goose conservation order, which will occur for 2 ½ months from late January through mid-April, will take place mostly in the wetland areas, leaving the upland areas open to other uses. This hunt is not

anticipated to bring large numbers of hunters, but is beneficial to the species and other wildlife due to overpopulation. With five or fewer turkey hunting permits issued in April and May, a vast majority of the refuge will still remain open to wildlife observation and other non-consumptive uses.

During public involvement for the CCP, some questioned why hunters are often allowed to go into some areas that the non-consumptive public is not allowed. The time of year, the numbers of people, and the opportunities afforded at other areas, and how these relate to habitat and wildlife, all go into our consideration. Since the number of hunters is significantly smaller than the number of people who observe wildlife at the refuge, the amount of people on the area is easier to plan, control and monitor. The relatively smaller number of hunters also do not have the same trampling effects on vegetation, especially from September through January, than the unregulated general public could create. As far as clearing new areas for wildlife viewing, we feel as though removing habitat for the sole purpose of increasing wildlife viewing opportunities conflicts with the Service mission and refuge's purposes because the reduction of habitat may decrease the biological diversity and the integrity of the area. Removing habitat fragments the landscape and may reduce the potential viewing of many species that are area-dependent or have specific habitat requirements. We also feel that the refuge has sufficient parking areas, hardtop roads, foot trails, and observation towers available for physical and visual access to wildlife. Refuge staff will continue to evaluate the wildlife observation and photography program on an annual basis and modify it, as warranted, given new biological or visitor data. This plan reflects a balanced and measured increase in facilities and opportunities for wildlife observation and photography, while continuing to meet fish and wildlife protection and management responsibilities. Map 4-6 depicts wildlife observation and photography opportunities and infrastructure.

Strategies

- Continue to provide wildlife observation and photography opportunities.
 - ✱ Refuge headquarters area
- Maintain 6 miles of hiking trails that include the Blue Goose Trail, Photography Blind Trail, Dike Trail, Black Farm Trail, Pine Grove Trail, and Boardwalk Trail.
- Maintain the photography blind on the Photography Blind Trail and observation platform (wheelchair accessible) on the Dike Trail.
- Provide canoeing and kayaking access on Turkle and Fleetwood Ponds.
- Maintain the visitor contact station at refuge headquarters and allow the sale of refuge approved items by the Friends of Prime Hook through a signed memorandum of agreement.
- Area open year-round except when closed for deer hunts.
 - ✱ Prime Hook Creek (includes mainstem of creek and Headquarters Canal)
- Maintain the 7-mile Canoe Trail and associated boat ramps for canoeing and kayaking.
 - ✱ Slaughter Canal
- Provide opportunities along the canal from Fowler Beach Road to Slaughter Beach Road. Access is by boat only.
 - ✱ Fowler Beach

- Continue to permit use by the general public on beach except during seasonal closures.
 - * Prime Hook Beach Road and Broadkill Beach Road
- Maintain and enhance existing roadside pull-offs.
- Area is open year-round.
 - * Water control structures at Petersfield Ditch, Slaughter Canal, and Cods Road are open year-round.
- Expand or enhance wildlife observation and photography opportunities by creating seven new trails totaling 3.7 miles using existing and already maintained trail and road networks. The total number of refuge trails becomes 14 with 9.9 miles.
 - * Except as noted below, access to all areas is provided everyday throughout the year from one-half hour before sunrise to one-half hour after sunset. Seasonal restrictions in areas where hunting occurs will allow access on every Sunday from September 1 through the deer and waterfowl hunting seasons, which typically end in February. Additional seasonal closures may apply through the second Saturday in May for hunting during the snow goose conservation order or turkey hunting. Due to the low number of permitted turkey hunters afield and that snow goose hunters will be hunting in wetland areas, a vast majority of the refuge will still remain open to wildlife observation and other non-consumptive uses.
 - * Unit I—Slaughter Beach Road (Slaughter Woods) Trail (NEW)
 - ❖ Create a one to two space parking lot and use the existing interior road as the trail. The location of the existing parking lot will not be used for this trail because it creates safety issues by requiring visitors to walk along the roadside.
 - ❖ Opportunities available year-round but only open every Sunday during the hunting season.
 - ❖ Unit I—Slaughter Canal (existing, but previously promoted for only fishing).
 - ❖ Opportunities available year round but only open every Sunday during the hunting season.
 - * Unit I—Willow Oak Trail (NEW)
 - ❖ Located north of Fowler Beach Road, access will be provided using the existing trail network.
 - ❖ Opportunities available year round but only open every Sunday during the hunting season.
 - * Units I and II—Fowler Beach (existing)
 - ❖ Open year-round with seasonal closures of designated beach dunes and overwash areas from March 1 through September 1.
 - ❖ Adaptive management is necessary if Fowler Beach Road, from Slaughter Canal to its terminus at the Delaware Bay, is abandoned

by DelDOT and donated to the Service. If, upon DelDOTs removal of the existing layer of asphalt overlying unconsolidated fill, the walking trail will serve its purpose of public use until marsh vegetation and hydrologic function reclaim the trail and the formally bisected habitat (Units I and II) function as one unit. When conditions are deemed unsafe, access will not be permitted to Fowler Beach for public use opportunities such as wildlife observation, wildlife photography, and fishing.

* Unit II—Fowlers South Trail (NEW)

- ❖ Use existing interior road to provide access
- ❖ Provide parking area at existing gate on north side of Fowler Road
- ❖ Explore the possibility of providing access to seasonal wetland (if developed) with a wheelchair-accessible photography blind
- ❖ Open with a seasonal closure of every day from September 1 through March 15 and if necessary during the during the snow goose conservation order or turkey hunting seasons.
- ❖ If and when the photography blind is available, the portion of this trail from the trailhead to the photography blind will be open year round and open every Sunday during the hunting season.

* Unit III—Prime Hook South Trails (NEW)

- ❖ Use existing parking lots and interior roads to provide access
- ❖ Increase nesting boxes for tree swallows and bluebirds through volunteer support where the public may observe wildlife activity
- ❖ Opportunities available year round but only open every Sunday during the hunting season

* Unit III—Deep Branch Road (Goose Pond) Trails (NEW)

- ❖ Using the existing hunting parking areas and interior road to provide access
- ❖ Open with a seasonal closure of every day from September 1 through March 15 and if necessary during the snow goose conservation order or turkey hunting seasons.

* Unit III—Refuge headquarters area (existing with NEW trail)

- ❖ Improve the trail base for the dike portion of the Blue Goose Trail
- ❖ Create the Broadkill Dike Trail (NEW)
- ❖ Open a portion of the existing interior road near the deer check station building to provide additional parking and wildlife observation opportunity.
- ❖ Open 363 days a year (closed for two deer hunts) and portions may be closed for turkey hunts.

- * Unit III—Prime Hook Creek (includes mainstem of creek & Headquarters Canal; existing)
 - ❖ Open with a seasonal closure of Eastern Prime Hook Creek (from Foord’s Landing to headquarters ramp): Closed every day from September 1 through March 15. Additional seasonal closures may apply through the second Saturday in May for hunting during the snow goose conservation order.
- * Unit IV—South of Broadkill Beach Road (NEW; existing but not currently open)
 - ❖ Reevaluate the trail and observation platform overlooking Vergie’s Pond
 - ❖ Option 1: Keep the existing trail and create a parking lot at the existing trail head.
 - ❖ Option 2: Abandon and remove the existing walkway. Reroute the trail to the east and construct a smaller, less intrusive boardwalk and trail to the firebreak and existing tower and a three to five space parking lot on the existing high ground.
 - ❖ Open with a seasonal closure from the Monday before Thanksgiving through March 15 and if necessary during the during the snow goose conservation order hunting season.
- * All Units—Interpretive auto tour route
 - ❖ Create an interpretive brochure outlining the wildlife viewing areas, trails, pull-offs, etc., that can be accessed from public roads and highways
 - ❖ Investigate the potential to use advanced technology (radio, compact disc, cell phones, or downloadable programming) to provide visitors with interpretive material about the refuge related to wildlife observation and photography.
 - ❖ Open year-round.
- * Improve access at boat launching areas.
 - * Upgrade boat ramp access on Fowler Beach Road for access to Slaughter Canal
 - * Designate Slaughter Canal a no wake zone.
 - * Work with private landowners to improve access to western end of Prime Hook Creek
 - * Within 5 years of the plan, open a boat ramp at Foord’s Landing for access to Prime Hook Creek
 - ❖ Provide visitor opportunities to canoe or fish for 3 miles in a loop, eliminating the need for two vehicles due to close proximity of the launch area at the refuge office.
- * Eliminate boat launching fees at all refuge boat ramps.
 - * Maintenance to boat ramps and parking areas will be funded through deferred maintenance projects

- Within 5 years of the CCP approval, develop a visitor services plan for the refuge.
- Add a new full-time law enforcement officer to enforce regulations.
- Enforce general regulations for wildlife observation and photography.
 - * No refuge-specific permits are required.
 - * Visitors must stay on the designated trail routes.
 - * Bicycling is allowed only on roads open to public vehicular traffic.
 - * The visitor contact station is open weekdays from 7:30 a.m. to 4 p.m. and seasonally on weekends.

**Objective 5.3 Recreational
Fresh and Saltwater Fishing
and Crabbing**

Provide high-quality fishing and crabbing opportunities.

Rationale

Fishing and crabbing on the Delmarva Peninsula are traditional outdoor pastimes and are deeply rooted in our American and Delaware heritage. Fishing accounts for 10 percent of the total visitation to the refuge (or nearly 10,000 annual visitors). Fishing has and will continue to be an integral component of the public use program at the refuge.

The opinions by the visiting public and community landowners were surveyed in 2004 and 2005 by USGS on behalf of the refuge (Sexton et al. 2007). About 20 percent of visitor respondents indicated that they fished on the refuge and had been fishing there an average of 11 years. When asked about the importance of fishing activities, all of the responses rated it as moderately important, and most anglers (89 percent) feel the refuge provides a quality fishing experience. Fishing on Prime Hook Creek was slightly more important than fishing at the water control structures and at Fleetwood and Turkle Ponds. Very few comments regarding improvements were made. A few respondents mentioned water levels, better access to some fishing areas, and providing catch-and-release fishing areas.

To improve the refuge's recreational fishing and crabbing program, we evaluated fishing on the refuge, incorporated the opinions of anglers and crabbers, and developed this plan in collaboration with our State partners in the Delaware Division of Fish and Wildlife. These program changes, which reflect a diversity of fishing preferences and opportunities, strive to meet the guiding principles for a quality refuge fishing program identified in Service policy 605 FW 3. They also support the Refuge System Improvement Act of 1997, which identifies fishing as one of the priority wildlife-dependent recreational opportunities that should be offered on refuges when deemed to be compatible.

Increasing fishing opportunities on the refuge will serve the demand for more fishing opportunities in Sussex County. Improved habitat quality resulting from proposed habitat restorations on the refuge will likely result in improving water quality and increasing some fish populations. This could positively affect the fishing experience and fishing success.

Bank and boat fishing opportunities have been expanded, where possible, to include additional areas for fresh and saltwater fishing. Some of the program changes include allowing saltwater fishing at Fowler Beach during nighttime hours, eliminating boat launching fees at all refuge boat ramps, opening Goose and Flaxhole Ponds as primitive fishing area (boat only access, manual propulsion only, boats must be ported in), and implementing seasonal closures to protect wildlife and reduce user conflicts.

A fishery assessment conducted at Prime Hook NWR in 1994 (USFWS 1994) recommended that consideration be given to opening Flaxhole Pond due to the healthy and desirable sport fishery in the pond at that time. Access to these ponds was noted in the refuge's 1986 fishing plan as an obstacle to providing this use for visitors. However, the refuge has since acquired land that will provide that access.

To minimize fishing mortality and increase the quality of fishing, we propose to adopt catch-and-release regulations, including the mandatory use of barbless hooks, for Turkle Pond, Fleetwood Pond, Goose Pond, Flaxhole Pond, and Prime Hook Creek west of Foord's Landing.

We have proposed seasonal closures in new and existing areas that will provide opportunities for fishing; these are discussed in detail in the strategies below. One new closure is the closure of the eastern portion of Prime Hook Creek from September 1 through March 15. Additional seasonal closures may apply until the second Saturday in May for hunting during the snow goose conservation order or turkey hunting.

The refuge proposes to allow fishing and crabbing at the pulloffs along Prime Hook Road due to increased visitor demand in this area and existing pulloffs already provide safe parking areas for wildlife observers and photographers. Access is restricted to only the pulloff area to provide safety for visitors and to avoid traffic issues. The refuge will consider fishing and crabbing along Broadkill Road and Fowler Beach Road in the future if there is a demand and if visitor safety and adequate parking can be guaranteed. Adequate parking and visitor safety along State-maintained roads has historically been an issue. Crabbing decreased significantly from 3,644 visits in 1976 to 880 visits in 1977 due to new regulations making state highway bridges into refuge waterways off limits in an effort to increase pedestrian safety along these roads.

The refuge will continue to partner with local bass fishing clubs to promote fishing to youngsters, provide opportunities for disabled anglers, conduct fishery assessment surveys in refuge waters, and make management recommendations.

The implementation of the refuge fishing program is consistent with State regulations and additional refuge regulations stipulated in 50 CFR. We will continue to evaluate the program on an annual basis and modify it, as warranted, given new biological or visitor data. This plan further develops an appreciation for fish and wildlife and expands public fishing opportunities. Map 4-6 depicts recreational fishing and crabbing opportunities and infrastructure.

Strategies

- Continue to provide fishing and crabbing opportunities in accordance with the State of Delaware fishing, crabbing, and boating regulations and seasons to include the following areas:
 - * Slaughter Canal between Fowler Beach Road and Slaughter Beach Road (boat access only)
 - * Slaughter Creek at Cods Road and water control structures at Petersfield Ditch and Slaughter Canal (shore access only; boats are not allowed at Slaughter Creek and Petersfield Ditch) open year-round
 - * Prime Hook Creek (boat access only; includes mainstem of creek and Headquarters Canal)
 - * Turkle and Fleetwood Ponds in headquarters area (boat and shore access): open year-round except when closed for deer hunts

- * Fowler Beach (surf fishing from shore only)
- Open Slaughter Canal between Fowler Beach Road and Slaughter Beach Road year round and only on Sundays from September 1 through the deer and waterfowl hunting seasons, which typically end in February. Additional seasonal closures may apply through the second Saturday in May for hunting during the snow goose conservation order or turkey hunting.
- Close Prime Hook Creek (mainstem of the creek and Headquarters Canal) to anglers during the following:
 - * Eastern Prime Hook Creek (from Foord's Landing to headquarters ramp): Closed every day from September 1 through March 15. Additional seasonal closures may apply through the second Saturday in May for hunting during the snow goose conservation order or turkey hunting.
- Expand fresh and saltwater fishing and crabbing opportunities to include the following areas:
 - * Open Fowler Beach (shore only) to night fishing by permit only
 - * Open Goose and Flaxhole Pond
 - * Designate this new area as a primitive fishing area.
 - * Provide access by boat only; manual propulsion only; float tubes allowed.
 - * Anglers must use the existing parking area and walk and carry in boat.
 - * Closed every day from September 1 through March 15 to avoid conflicts with deer hunting and minimize disturbance to waterfowl. Additional seasonal closures may apply through the second Saturday in May for hunting during the snow goose conservation order or turkey hunting.
 - * Area will remain closed until fishery and contamination surveys are completed and management recommendations are made (see objective 3.2 of habitat management objectives).
 - * Open Prime Hook Beach Road to fishing and crabbing
 - * Parking only allowed on existing pulloffs and access is restricted to the pulloff area to provide safety for visitors and to avoid traffic issues.
 - * The refuge will consider fishing and crabbing along Broadkill Road and Fowler Beach Road in the future if there is a demand and if visitor safety and adequate parking can be guaranteed.
 - * Adopt catch-and-release regulations, including the mandatory use of barbless hooks, for Turkle Pond, Fleetwood Pond, Goose Pond, Flaxhole Pond, and Prime Hook Creek west of Foord's Landing.
 - * Regulations, such as catch-and-release and the use of barbless hooks, may be modified if fishery surveys and analysis indicate that other management options are needed to sustain healthy fish populations such as creel or size limits.
- Conduct refuge fishery inventories every 5 years to assess fishery health and water quality of aquatic habitats; documented information should consist of species composition, class size and distribution, abiotic conditions and other information to adjust management prescriptions as needed and recommended

by the Service's Fishery Division. Surveyed areas should include Turkle, Fleetwood, Goose, and Flaxhole Ponds, and Prime Hook Creek. Analyze data and provide management recommendations (seasonal closures, creel size and species limits, etc.).

- Eliminate boat launching fees at all refuge boat ramps.
 - * Maintenance to boat ramps and parking areas will be funded through deferred maintenance projects.
- Do not allow recreational gill-netting, commercial fishing, food fishing with equipment other than hook and line on the refuge, or crabbing using pots or trot lines.
 - * The use of gill netting by commercial or recreational fishermen has occurred in the tidal waterways of Slaughter Canal for over 30 years by a small number of fishermen. These activities, whether commercial or recreational, are not consistent with goals and objectives in any refuge management plan, conflict with rod and reel recreational fishermen and wildlife observers using canoes or kayaks, and has the potential to harm non-targeted fisheries through incidental by-catch. Fishing for bait fish is permitted for recreational uses only, subject to regulations stated in Title 7 (Conservation) of the Delaware State Code.
 - * Crabbing will only be permitted using hand lines, collapsible traps, crab nets, or hoop crab nets. Collapsible traps must be fished from the shore only and the owner must be present. Other types of crabbing equipment are prohibited. The use of crab pots could conflict with 16USC668dd, 50CFR 27.93, abandonment of property, on a national wildlife refuge, if left unattended, and the use of trot lines would cause conflicts with other recreational activities, particularly on Slaughter Canal.
- Increase or enhance disabled fishing opportunities, particularly for non-ambulatory wheelchair users, at the wheelchair-accessible fishing pier on Fleetwood Pond.
- Improve access at boat launching areas.
 - * Enhance boat ramp access on Fowler Beach Road for access to Slaughter Canal.
 - * Work with private landowners to improve access to the western end of Prime Hook Creek.
 - * Within 5 years of the plan, open a boat ramp at Foord's Landing for access to Prime Hook Creek.
 - * Designate Slaughter Canal as a no wake zone.
- Provide information about fish consumption advisories and water level management on refuge waterways at the refuge office, refuge kiosks, and on the refuge's Web site.
- Harvest information is not required.
- Restrict bank fishing (where permitted) to designated areas off of State-maintained highways at Petersfield Ditch, Slaughter Creek, and Slaughter Canal.
- No check-in/out required.

- Within 5 years of the CCP approval, develop an updated fishing plan for the refuge.
- General regulations for recreational fishing and crabbing
 - * No refuge-specific permits are required, except for night fishing at Fowler Beach.
 - * Catch and release regulations apply, including mandatory use of barbless hooks, for Turtle Pond, Fleetwood Pond, Goose Pond, Flaxhole Pond, and Prime Hook Creek.
 - * Boats must be ported in by foot from the parking areas to Goose and Flaxhole Ponds.
 - * Boat motor restrictions.
- Manual propulsion only on Goose and Flaxhole Ponds
 - * Crabbing will be conducted using only hand lines, collapsible traps, crab nets, or hoop crab nets. Collapsible traps must be fished from the shore only and the owner must be present. All other types of crabbing equipment are prohibited.

Objective 5.4 Environmental Education and Interpretation

Provide high-quality environmental education and interpretation opportunities.

Rationale

Interpreting the resources and challenges of the refuge to the general public and incorporating these topics into school curricula are important ways to influence the future well-being of the refuge and the Delmarva Peninsula. Only through understanding and appreciation will people be moved to personal and collective action to ensure a healthy refuge for the future. Interpretation and environmental education are also key to changing attitudes and behavior, which affect the refuge through off-refuge land-use decisions and on-refuge conduct and use.

The refuge provides onsite and offsite environmental education and interpretive programs to visitors of all ages and abilities. Programs include structured educational field programs tied to national and State education standards, guided interpretive canoe and hiking trips, special events, lecture programs, self-guided interpretive hiking trails, interpretive signs and displays, the visitor contact station/Friends Group sales outlet, refuge Web site, and refuge brochures. The refuge also conducts interpretive programs to local civic organizations and displays refuge information at numerous offsite events. We estimate that our environmental education and interpretation programs reach over 5,400 people a year. Refuge volunteers and Friends Group members play a considerable role in the success of these programs, which would not be possible without their assistance. Interpretive refuge themes focus on the awareness and importance of the conservation of waterfowl and other migratory birds, the endangered Delmarva fox squirrel and other threatened or endangered species, and their habitats.

To improve environmental education and interpretation on the refuge, we evaluated these programs, incorporated the opinions of visitors and community residents, and developed this plan in collaboration with our State partners in the Delaware Division of Fish and Wildlife. These program changes, which reflect a diversity of preferences and opportunities for environmental education and interpretation, strive to meet the guiding principles for a quality refuge environmental and interpretive program identified in Service policy 605 FW 6 and 7.

Expanded and enhanced opportunities in environmental education and interpretation will be accomplished through developing and implementing more interpretive guided walks (fishing, birding, nature), interpretive auto tour and hiking routes using advanced technology (radio, compact disc, cell phones, or downloadable programming), and a new public use map and regulations tear sheet, in addition to the revitalizing of the waterfowl festival in October, and continuing existing programs. The refuge also proposes to expand the visitor contact station/refuge office building. This expansion will provide offices for staff, volunteers, and the Friends Group, feature a larger auditorium, and provide storage for biological and public use programs.

This objective reflects an increase in interpretation and environmental education capability and programs. It also reflects the basic needs for a refuge to provide the necessary facilities to inform and educate visitors and help them make the most of their refuge visit. Since environmental education is curriculum-based and labor-intensive, initial efforts will be limited with existing staff, but will increase if and when staff are added.

Refuge staff will continue to evaluate the environmental education and interpretation programs on an annual basis and modify them, as warranted, given new biological or visitor data. This plan reflects a balanced and measured increase in facilities and opportunities for environmental education and interpretation, while continuing to meet fish and wildlife protection and management responsibilities. Map 4-6 depicts facilities and infrastructure used to support environmental education and interpretation.

Strategies

- Conduct environmental education and interpretive programs in the following areas of the refuge: Headquarters Area including but not limited to hiking and canoeing trails, visitor contact station, Turtle and Fleetwood Ponds; Fowler Beach; and at roadside pull-offs along Prime Hook and Broadkill Beach Roads.
- Continue to facilitate educator-led environmental education programs that focus on refuge key resources and messages for local schools, scout troops, and other organized education-oriented groups.
 - * Integrate existing Service national education programs into the refuge's education program. In particular, consider the Shorebirds Sister Schools program, especially in combination with the Delaware Aquatic Resources Center's Green Eggs and Sand program. Other programs to consider include Hands on the Land and the Nature of Learning.
 - * Continue to partner with local educational institutions, refuge volunteers, Friends of Prime Hook, and other partners to plan, develop, and implement environmental education programs. This network will act as supporters of the refuge, advocates for environmental education, and as a liaison to the community.
 - * Continue to respond to requests for onsite and offsite environmental education and interpretive programs when staffing and funding allows.
- Continue to enhance detailed environmental education and interpretive programs for the refuge.
- Continue to provide interpretive materials and programs explaining the historic, cultural, and natural resources of the refuge to gain public awareness and understanding of their value.
 - * Develop a tear sheet with public use regulations and a map that includes fishing information.

- * Develop a hunting brochure containing regulations and associated maps, which will be available at the refuge office or on the refuge's Web site.
- * Develop a new general refuge brochure.
- * Develop an annual schedule of interpretive activities.
- * Provide regularly guided field trips for nature, birding, fishing, photography, etc.
- * Continue "An Evening at the Hook" monthly lecture series.
- * Continue partnership with Friends of Prime Hook in hosting the Vandegrift memorial lecture series and annual nature photography contest and exhibition.
- * Continue to provide self-guided interpretive facilities and materials, including signs, maps, kiosks, etc., for the Blue Goose Trail, Photography Blind Trail, Dike Trail, Black Farm Trail, Pine Grove Trail, Boardwalk Trail, Canoe Trail, and the trail and observation platform off Route 16 near Vergie's Pond.
- * Continue to provide information to the public through the refuge's website.
- * Continue to partner with Delaware Department of Transportation for maintenance of directional highway signage for the refuge.
- * Continue to maintain a universally accessible full-service visitor contact station with a sales outlet operated by the Friends of Prime Hook. The visitor contact station will continue to include interpretive displays and various mounted species of animals found on the refuge and will be staffed mainly through volunteer support.
- * Participate in national interpretive events such as National Fishing Week and International Migratory Bird Day.
- Continue partnership with Milton Chamber of Commerce in hosting the Horseshoe Crab-Shorebird Festival in May.
- Continue partnership with Lower Sussex Bassmasters to host an annual youth fishing tournament in Milton to celebrate National Fishing Week and promote fishing to youngsters.
- Conduct routine condition reviews of interpretive signs and information kiosks, and complete maintenance and sign replacement as needed.
- Enhance and continue to partner with local educational institutions, refuge volunteers, Friends of Prime Hook, and other partners to plan, develop, and implement environmental education programs that focus on refuge key resources and messages for local schools, scout troops, and other organized education-oriented groups. This network will act as supporters of the refuge, advocates for environmental education, and a liaison to the community.
- * Develop a partnership with a local school district or non-governmental organization to provide funding (full- or part-time) for an onsite education specialist to coordinate the development and implementation of curriculum based environmental education programs.
- * Evaluate the potential for adult educational partnerships through universities or programs such as Elder Hostel.

- Conduct environmental education and interpretive programs in newly opened areas outlined in objective 5.2.
- Offer curriculum-based programs developed by NASP to encourage family participation in archery shooting.
- Develop detailed environmental education and interpretive programs for the refuge that tiers to the visitor services plan.
- Increase and enhance interpretive materials and programs explaining the historic, cultural, and natural resources of the refuge to gain public awareness and understanding of their value.
 - * Develop interpretive auto tour and hiking routes using advanced technology (radio, compact disc, cell phone, or downloadable programming).
 - * Provide interpretive facilities and materials for newly opened areas outlined in objective 5.2.
 - * Increase interpretive programs by providing more regularly guided field trips for nature, birding, fishing, photography, etc.
 - * Implement a volunteer master naturalist program.
 - * Develop new interpretive panels and maps for information kiosks near the refuge office and along State roads.
 - * Revitalize the waterfowl festival, or similar event, celebrating National Wildlife Refuge Week in October only if additional staff is available.
 - * Explore other partnerships to develop programs for various age groups.
- Expand the existing visitor contact station/refuge office building to provide offices for staff, volunteers, and the Friends Group, feature a larger auditorium, and provide storage for biological and public use materials.

Sea Level Rise and Climate Change Strategies:

- In conjunction with conservation partners, develop useful and accessible information resources to help Americans fully appreciate the significant implications of sea level rise and climate change on refuge species and their habitats, and to engage these constituencies in seeking solutions.
- Incorporate climate change and sea level rise information and messages into interpretive sign panels, brochures, Web sites, and environmental education programs.
- Hire a temporary staffing position to assist in these outreach efforts.

Objective 5.5 Other Recreational Use

Provide opportunities for the public to use and enjoy the refuge for traditional and appropriate non-wildlife-dependent recreation that is compatible with the purposes for which the refuge was established and the mission of the Refuge System.

Rationale

Public entry and use regulations serve to protect fish, wildlife, plants, and habitat. Public use regulations were last reviewed and amended in 1993. However, the resources and public use of the refuge are dynamic, and periodic review will ensure that regulations are needed, clear, and effective. In addition, new regulations may be required to safeguard resources or address new or emerging problems recognized by managers and law enforcement officers. An annual review will provide a more systematic process than in the past.

Some uses are not dependent on the presence of fish and wildlife; however, these activities are allowed to continue at designated locations in a manner that will give maximum consideration to the fish and wildlife purpose of the refuge. We estimate that approximately 2,000 visitors a year participate in one of these uses and are not counted in the numbers itemized under the six priority wildlife-dependent public uses described above.

Non-priority recreational uses that the refuge manager proposes as compatible on this refuge, with stipulations, are detailed in appendix E.

Strategies

- Refer to prohibited non-priority uses that are discussed earlier in the Appropriateness and Compatibility Determinations section.
- Allow the following non-priority uses that were found to be compatible on the refuge: research, mosquito control, and public leases of the Federal Aviation Administration tower.
 - * Canoeing (includes boat and kayaking), walking, hiking, and jogging are allowed uses. These uses were considered as a means of access under the compatibility determinations.
- Allow commercially guided tours for wildlife observation (including commercially guided tours for continuing education). Adhere to Commercial Wildlife Observation Guide Program Stipulations found in appendix E and to information found in Specialized Uses in the section titled, Actions Common to All Alternatives.
 - * Will require a special use permit and appropriate fee and minimal disturbance to wildlife resources and their habitat.
 - * Will be covered by compatibility determinations for their respective uses (wildlife observation, wildlife photography, etc.)
- Provide the public and State of Delaware ample opportunity to review and comment on any new or substantially changed regulation.
- Use national guidance and *Federal Register* process for codifying any changes and make them a part of the CFR governing national wildlife refuges.
- Post pertinent regulations at boat landings and other public use areas, such as trailheads, informational kiosks, and the visitor contact station.
- Be proactive with law enforcement to inform and educate the public on refuge regulations and seek their compliance.
- Allow commercial photography.
 - * Guidance in 43 CFR Part 5 will be followed for fees related to commercial filming and still photography.
- Prohibit commercial fishing, commercial trapping of muskrat, raccoon, etc., turtle trapping, picnicking, 5K road race, beekeeping, waterfowl retrieval permits, dog walking, roller blading, competitions or organized group events, and non-competitive organized events.

GOAL 6.

Outreach and Community Partnerships

Collaborate with the local community and partners to complement habitat and visitor service programs on the refuge and the surrounding landscape.

Objective 6.1 Community Outreach

Increase community outreach by conducting up to 15 outreach programs or events¹ each year, and initiate up to 10 news articles to increase community understanding and appreciation of the refuge's significance to natural resource conservation and its contribution to the Refuge System, and to garner additional support for refuge programs.

Rationale

From the results of a refuge visitor and community survey conducted in 2004 and 2005 by USGS (Sexton et al. 2007), nearly a quarter of the community members and refuge visitors are unsure about their level of trust in decisions that the Service makes about managing the refuge. The community surrounding the refuge is aware of and engaged in natural resources decision-making in both passive activities, such as signing a petition, and active activities, such as joining a special interest group or attending a public meeting. It is important, if we are to be a valued part of the communities we serve, that we communicate often with our local citizens. News articles and personal appearances inform our neighbors about what we are doing and why, which we hope will lead to increased understanding, appreciation, and support of our programs. Feedback we receive from these outreach efforts allows us to better understand issues that are important in our communities, and how our management may affect them. A planning process such as development of the CCP is an opportunity to build relationships and improve trust not only with visitors and community residents with whom the refuge has established relationships, but also with those who are less familiar with the refuge or have not engaged in the process due to lack of trust in the agency or uncertainty of their role in the process.

Strategies

- Continue to conduct outreach in conjunction with refuge interpretive programs highlighted under objective 5.4.
- Continue to work within community forums such as the Milton, Milford, and Lewes Area Chambers of Commerce; Southern Delaware Tourism; town meetings; State Fish and Wildlife Advisory Council meetings; and other venues.
 - * Continue to co-host or partner with local Chambers of Commerce and the Friends of Prime Hook NWR to conduct the following annual community events: horseshoe crab-shorebird festival in May, youth fishing tournament in June, nature photography contest in October, and the Vandegrift memorial series in summer/fall. While the main venues for some of these programs are in town, onsite programs are included when staffing and funding are available.
- Continue to issue news releases on significant accomplishments and to promote special events and announce major initiatives.
- Continue to maintain the refuge's Web site and post information on refuge kiosks.
- Continue to honor requests for speaking engagements by local community and civic organizations to inform members about refuge purposes and activities.
- Increase outreach in conjunction with interpretive programs under objective 5.4 by offering additional and more diversified activities, special events, or programs.

¹ *Note:* These events will be both onsite and offsite, and are the same (not additive) as those discussed under objective 5.4.

- Create and improve outreach materials and continue to issue news releases on significant accomplishments, advertise special events, and announce major management initiatives.
 - ✱ Update refuge fact sheets.
 - ✱ Create media press kit to promote events scheduled on the refuge.
 - ✱ Enhance Web page with virtual tours of the refuge and a wildlife webcam.
- Participate in those community service, professional association, and Chamber of Commerce events throughout the Delaware Bay ecosystem that will provide the greatest benefit to achieving goals and objectives and furthering the mission of the Refuge System.
 - ✱ Coordinate with the Delaware Division of Fish and Wildlife and other partners to develop outreach materials better explaining the refuge's habitat management and visitor services programs.
- Conduct public meetings, as needed, to facilitate communications and raise awareness and understanding of, and seek support for, refuge management programs.

Climate Change and Sea Level Rise Adaptation Rationale

DNREC conducted a survey to gauge the opinions of Delaware residents on climate change and sea level rise in 2010 and received more than 1,500 responses. The respondents were asked questions to gauge their knowledge, concerns, attitudes, perceptions, and opinions about the issues involving climate change and sea level rise. When asked to rank lists of general and environmental issues, respondents ranked climate change and sea level rise last on both lists (DNREC 2010). The survey indicated that Delawareans were aware of climate change and sea level rise and, while ranking those issues very low, they were concerned with other issues related to climate change and sea level rise, such as water pollution, air quality, and loss of forest habitat (DNREC 2010). The results of the survey illustrate that there is more work to be done to increase awareness of climate change and sea level rise. The refuge will work to better inform the public about climate change and sea level rise and relay how the Service and the refuge plan to address these issues.

The Service proposes as a goal in its draft appendix: 5-Year Action Plan for Implementing the Climate Change Strategic Plan (USFWS 2009b), that “We will engage Service employees, our public and private partners, our key constituencies and stakeholders, and everyday citizens in a new era of collaborative conservation to seek solutions to the impacts of climate change and other 21st century stressors to fish, wildlife, and habitats.” Proposed actions include providing Service employees with climate change information, education and training; sharing climate change information, education, and training opportunities with external audiences; and forging alliances and creating forums on climate change to exchange information and knowledge and to influence policy internationally. Our strategies, as outlined in this document support this goal.

Sea Level Rise and Climate Change Strategies

In conjunction with conservation partners, develop useful and accessible information resources to help Americans fully appreciate the significant implications of sea level rise and climate change for refuge species and their habitats, and engage these constituencies in seeking solutions. These strategies are supported by the Service's strategic plan for responding to accelerating climate change objective 6.2.

- Incorporate these messages into interpretive sign panels, brochures, Web sites, and environmental education programs.

Objective 6.2 Private Landowner Assistance

- Hire a temporary staffing position to assist in these efforts.

Work with regional and State partners to develop a common, consistent message.

- Within 5 years of CCP approval, establish a greater role assisting landowners who seek to maintain and improve wildlife habitat on private lands within and adjacent to the refuge boundary.

Rationale

Our *Phragmites* control and education program, in conjunction with the wildland urban interface program, is one example of our successes in working with private landowners. We have partnered with more than 150 private landowners to control hundreds of acres of *Phragmites* on the refuge. We hope to continue this effort over time to keep this invasive plant from increasing its territory, and to use it as a model to assist landowners in controlling other invasive plants on private lands. We believe there are many landowners adjacent to the refuge boundary area who would gladly take on more responsibility to manage their lands to benefit wildlife whether for invasive species control or habitat restoration and enhancement, if they had assistance to get started. We will continue to utilize the Service's wildland urban interface program and seek assistance from the Service's private lands biologist. Additional staffing will expand refuge assistance to private landowners. There are funding sources specifically targeted for improving wildlife habitat on private lands that could be competitively directed to the refuge to implement on-the-ground projects.

Strategies

- Continue our current level of *Phragmites* control and other invasive plant initiatives on private land through programs such as wildland urban interface.
- Continue to provide technical assistance to private landowners on invasive species identification and control, wetland protection, and habitat restoration and management.
- Seek grants and other funding sources to assist private landowners.
- Expand our technical assistance capability to assist private landowners on invasive species identification and control, wetland protection, and habitat restoration and management.

Climate Change and Sea Level Rise Adaptation Rationale

Adaption to climate change and sea level rise requires the refuge to consider lands and waters outside the refuge boundaries. There are several partnership incentive programs that could be used to create collaborative conservation partnerships such as Partners for Fish and Wildlife, safe harbor agreements, habitat conservation plans, Natural Resource Conservation Service incentive programs, etc. These strategies are supported by the Service's strategic plan objective 2.3.

One example of a potential partnership is restoring the natural hydrology to lands that may or currently are impacted by sea level rise. In many cases ditches, some of which were dug more than 50 years ago to drain farmland and control mosquitoes, now serve to transport brackish water inland, a problem that could become increasingly prevalent as sea level rises. Saltwater intrusion into agricultural soils and peat collapse are major consequences of this process. Plugging ditches in selected places to reduce saltwater flow inland could be effective for local stakeholders. Another option is to install new water control structures, such as tide gates, in selected locations (Poulter et al. 2008). This technique is currently being used elsewhere on the Delmarva Peninsula. Plugging ditches will also help restore natural drainage patterns to the marshes.

Sea Level Rise and Climate Change Strategies

- Work with partners to identify how key ecological processes are likely to be affected by climate change
- Determine how management actions might help maintain or restore key ecological processes using the various incentive programs offered Federal and State agencies and other conservation organizations.

Objective 6.3 Regional and Community Partnerships

Within the next 15 years, enhance our existing partnerships, and seek additional, collaborative relationships with Federal, State, and local government agencies and regional and community economic development and conservation organizations to fulfill mutual natural resource conservation mandates and help us meet our wildlife, habitat, and visitor services objectives.

Rationale

Partnerships are essential for this refuge to accomplish natural resource conservation mandates and meet wildlife, habitat, and visitor service objectives. Working in partnership encourages broader cooperation between the Service and local communities, interest groups, and other agencies. The Service can be a resource to the community in providing valuable technical assistance to area conservation groups. Sharing resources where mutually compatible conservation objectives are apparent is cost-effective and in the best interest of the Service, the partner organization, and the public.

We will maintain the existing partnerships identified in chapter 3, while also seeking new ones consistent with refuge goals and objectives. The Delaware Division of Fish and Wildlife, Ducks Unlimited, the Nature Conservancy of Delaware, the Conservation Fund, USGS, Southern Delaware Tourism, local Chambers of Commerce, and many others have been particularly important and valued partners. These relationships are vital to our success in managing all aspects of the refuge—conserving land, managing habitats and protecting species, outreach and education, and providing wildlife-dependent recreation.

We will continue to work cooperatively with the Delaware Division of Fish and Wildlife to develop a management plan for wildlife management and public recreational use of this area and associated waters, including Prime Hook Creek. We will also work with them to complete a memorandum of understanding to coordinate activities within the State boundary.

We will continue to work closely with other offices within the Service on mutually important issues and seek new opportunities to find cooperative solutions to problems that affect the refuge but are beyond the ability of the refuge alone to address. One important example is the management of snow goose populations, which will require cooperation with the Migratory Bird Office, as well as State agencies and private landowners. On this issue, we will work with State and local partners on outreach, and with regional and Migratory Bird Office biologists on monitoring and developing population targets.

Citizen involvement is critical to the well-being of the Refuge System and the natural resources that depend on those lands. When local citizens and other stakeholders of a refuge can see firsthand our conservation work, they become an informed constituency on behalf of conservation.

The Friends of Prime Hook National Wildlife Refuge, Inc. (Friends Group) and refuge volunteers have been extremely helpful in promoting an appreciation of natural and cultural resource conservation and facilitating the implementation of priority refuge projects. The Friends Group is instrumental in conducting outreach about the refuge and its opportunities to the community and in accomplishing many programs through their hard work, dedication, and fundraising efforts. Refuge volunteers are instrumental in refuge management

activities including maintenance, habitat management, visitor services, and outreach programs.

Refuge volunteers and the Friends Group play a vital role in the conservation and management of our natural and cultural resources. The refuge currently has an active volunteer program involving more than 100 citizens. These volunteers contribute 6,000 hours annually, assisting with a full range of administrative, biological monitoring, invasive species control, and visitor services tasks. The nurturing and use of volunteers will continue as a vital component of many of the objectives outlined in the CCP. The Friends of Prime Hook, a citizen-based Friends Group, also raises funds for needed projects, conducts special programs which support the goals of the refuge and the mission of the Refuge System, and works to educate the public. Like volunteers, the Friends Group will play an important role in the strategies to achieve many of the objectives outlined in this document.

Strategies

- Continue to maintain the collaborative relationship with Federal, State, and local governmental agencies to meet natural resource mandates and objectives. Examples include providing office space for USDA Wildlife Services; coordinating the waterfowl hunting program on the adjacent Prime Hook Wildlife Area of the Delaware Division of Fish and Wildlife; and accomplishing refuge projects with the aid of crews from the Delaware Department of Corrections, water level management projects with Ducks Unlimited, land acquisition with The Conservation Fund and The Nature Conservancy of Delaware, and biological and visitor surveys with USGS.
- Work with conservation partners to achieve commons goals; establish memorandums of understanding, memorandums of agreement, and cooperative agreements as appropriate.
- Share resources, equipment, and/or expertise with State and private landowners.
- Continue to support and offer guidance to the Friends of Prime Hook NWR organization.
 - * Work with the Friends Group to continue to seek outside support for refuge projects, develop public use programs, coordinate refuge projects, operate the sales outlet, plan and conduct public events, conduct community outreach, promote national Service initiatives as they develop, and respond to public inquiries about the refuge.
- Continue to partner with the Friends of Prime Hook, refuge volunteers, and other partners to assist with maintenance of trails, observation platforms, photography blinds, and benches and to promote opportunities in wildlife observation and photography.
- Continue to partner with the Friends of Prime Hook to host the nature photography contest and exhibition.
 - * Continually update the memorandum of agreement between the Friends Group and the Service.
 - * Continue to provide a primary liaison between the Friends Group and the Service.
 - * Continue to support the Friends Group newsletter, distributed to their membership by regularly providing information, articles, and photos about refuge management and visitor services programs.

- ✱ Continue to work with the Friends Group on a regular basis to seek alternative funding sources and partnerships for various projects to benefit the refuge.
- Continue to offer volunteer opportunities to assist with accomplishing projects in the refuge's biological, maintenance, and visitor services program areas and in carrying out the mission of the Service and Refuge System.
 - ✱ Continue to implement volunteer recruitment, training, and appreciation/recognition events.
 - ✱ Continue to implement the resident volunteer work-camper program.
 - ✱ Continue to maintain and observe tree swallow and bluebird nest boxes for public viewing, pending volunteer support.
 - ✱ Continue to provide refuge-sponsored guided birding field trips by volunteers.
- Continue to collaborate with educational institutions to conduct research and investigations seeking answers to important natural resource issues on the refuge and within the Refuge System, and contribute our basic understanding of important natural resource issues worldwide.
- Enhance our existing collaborative relationships, and seek additional ones, to increase the likelihood of meeting natural resource mandates and objectives.
- Participate in regional and local community economic development and conservation partnerships and initiatives.
- Facilitate demonstration areas on the refuge and on other conservation lands that showcase applied management to benefit natural resources.
- Enhance the volunteer program to better assist with accomplishing refuge projects
 - ✱ Develop a refuge volunteer plan and handbook that covers volunteer program coordination, training, job descriptions, volunteer policy, recruitment policy, monitoring, evaluation, dispute, and termination policies.
 - ✱ Explore the possibility of constructing a bunk house or other similar type housing for interns and volunteers to support the refuge's biological and public use programs.
 - ✱ Expand the resident workcamper volunteer program.

Climate Change and Sea Level Rise Adaptation Rationale

The rationale is the same as stated above under objective 6.1.

Sea Level Rise and Climate Change Strategies

- Work with Federal, State, and conservation organizations on land acquisition priorities.
- Enhance existing and develop new partnerships to conduct research related to fish and wildlife adaptation to climate change and sea level rise on the refuge, in neighboring watersheds, and elsewhere in the State of Delaware.
- Within 1 year, establish a cooperative agreement with the Delaware Coastal Program on research and monitoring needs for the refuge.

Table 4-5. Summary of Hunting and Wildlife Observation Opportunities, by Month

This table shows what areas of the refuge are open for hunting and wildlife observation by month. It is color-coded to show the differences among the alternatives in hunting and wildlife observation opportunities. Where overlaps in hunting and wildlife observation occur, the table also describes how conflicts between user groups are minimized. For example, some areas are only open to wildlife observation on Sundays and in other areas only hunted portions are closed to wildlife observation.

CCP – Prime Hook NWR

KEY

H = Hunting Open W = Wildlife Observation/Photography Open

Unit Name	Area	Month											
		Jan ¹	Feb ¹	Mar ¹	Apr ¹	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Unit I	Slaughter Canal Area	H, W*	H, W*	H, W	H ² , W	W	W	W	W	H, W*	H, W*	H, W*	H, W*
	Slaughter Canal	H, W*	H, W*	H, W	H, W	W	W	W	W	H, W*	H, W*	H, W*	H, W*
	Fowler North Area	H, W*	H, W*	H, W	H ² , W	W	W	W	W	H, W*	H, W*	H, W*	H, W*
	Fowler Beach	W	W	W ^B	W ^B	W ^B	W ^B	W ^B	W ^B	W	W	W	W
Viewing at Water Control Structure at Slaughter Canal	Roadside Viewing on Slaughter Beach Road & Fowler Beach Road	W	W	W	W	W	W	W	W	W	W	W	W
	Viewing at Water Control Structure at Slaughter Canal	W	W	W	W	W	W	W	W	W	W	W	W

*Open only on Sundays

¹Wetland areas only open to hunting during the snow goose conservation order from Jan/Feb through mid-April and will involve temporary closures of portions of the hunt area to other users

² Turkey hunting for five hunters is available in portions of the 3,700 acre turkey hunt area; only hunted portions will be closed to other visitors

^B Indicates a seasonal closure of designated beach dunes and overwash areas – access to the intertidal zone is permitted

KEY

H = Hunting Open W = Wildlife Observation/Photography Open

Unit Name	Area	Month											
		Jan ¹	Feb ¹	Mar ¹	Apr ¹	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Unit II	Fowler Beach	W	W	W ^B	W ^B	W ^B	W ^B	W ^B	W ^B	W	W	W	W
	Fowler South Area	H ^{S1} , W ^{**}	H ^{S1} , W ^{**}	H ^{S1} , W	H, W	W	W	W	W	H, W ^{**}	H, W ^{**}	H ^{S1} , W ^{**}	W ^{**}
	Cods Road Area	H	H	H	H	CLOSED	CLOSED	CLOSED	CLOSED	H	H	H	H
	Oak Island	H ^{S1}	H ^{S1}	H ^{S1}	H	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	H	CLOSED
	Prime Hook North Area	H	H	H	H ²	H ²	CLOSED	CLOSED	CLOSED	H	H	H	H
	Roadside Viewing on Prime Hook Beach Road & Cods Road	W	W	W	W	W	W	W	W	W	W	W	W
	Unit II Marsh (Sanctuary)	CLOSED ^S	CLOSED ^S	CLOSED ^S	CLOSED ^S	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED

* Open only on Sundays

** Upon completion of photography blind, this portion of trail will be open year round and only on Sundays during the hunting season

¹ Wetland areas only open to hunting during the snow goose conservation order from Jan/Feb through mid-April and will involve temporary closures of portions of the hunt area to other users

² Turkey hunting for five hunters is available in portions of the 3,700 acre turkey hunt area; only hunted portions will be closed to other visitors

^S Indicates a sanctuary area unless open for hunting during the snow goose conservation order

^{S1} Indicates a sanctuary area from the end of November through March 15 unless open for snow goose conservation order

^B Indicates a seasonal closure of designated beach dunes and overwash areas – access to the intertidal zone is permitted

KEY

H = Hunting Open

W = Wildlife Observation/Photography Open

Summary of Hunting and Wildlife Observation Opportunities, by Month

Unit Name	Area	Month											
		Jan ¹	Feb ¹	Mar ¹	Apr ¹	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Unit III	Prime Hook South Area	H, W*	H, W*	H, W	H ² , W	H ² , W	W	W	W	H, W*	H, W*	H, W*	H, W*
	Prime Hook Creek – East of Foord's Landing	H ^{S2}	H ^{S2}	H	H, W	W	W	W	W	H	H	H	H
	Prime Hook Creek – West of Foord's Landing	W	W	W	W	W	W	W	W	W	W	W	W
	Unit III Marsh (North & Mid Sections)	H	H ^{S2}	H ^{S2} , W	H ^{S2} , W	W	W	W	W	H	H	H	H
	Unit III Marsh (Southern Section = Sanctuary)	CLOSED ^S	CLOSED ^S	CLOSED ^S	CLOSED ^S	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED
	Headquarters Area	H, W ^D	W	W	H ² , W	H ² , W	W	W	W	W	W	H, W ^D	W
	Jefferson Lofland Area (Deep Branch Road Trail)	H, W***	H, W***	W***	H ² , W	H ² , W	W	W	W	H, W***	H, W***	H, W***	H, W***
	Millman Area	H	H	H ²	H ²	CLOSED	CLOSED	CLOSED	CLOSED	H	H	H	H
	Viewing at Water Control Structure at Petersfield Ditch	W	W	W	W	W	W	W	W	W	W	W	W
	Roadside Viewing on Prime Hook Beach Road & Broadkill Beach Road	W	W	W	W	W	W	W	W	W	W	W	W

* Open only on Sundays

*** Seasonal closures to non-consumptive users from September 1 to March 15 to reduce cumulative disturbance to waterfowl in and adjacent to Goose & Flaxhole Ponds

¹ Wetland areas only open to hunting during the snow goose conservation order from Jan/Feb through mid-April and will involve temporary closures of portions of the hunt area to other users

² Turkey hunting for five hunters is available in portions of the 3,700 acre turkey hunt area; only hunted portions will be closed to other visitors

^S Indicates a sanctuary area unless open for hunting during the snow goose conservation order

^{S2} Indicates a sanctuary area from the end of the hunting season through March 15 unless open for snow goose conservation order

W^D Indicates that the HQ area is only closed to non-consumptive users for a deer hunt for one day during the indicated month

KEY

H = Hunting Open

W = Wildlife Observation/Photography Open

Unit Name	Area	Month											
		Jan ¹	Feb ¹	Mar ¹	Apr ¹	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Unit IV	Graves Area	H	H	H	H	CLOSED	CLOSED	CLOSED	CLOSED	H	H	H	H
	Trail on Vergie's Pond	H ^{s1} , W ^{s1}	H ^{s1} , W ^{s1}	H ^{s1} , W ^{s1}	H, W	W	W	W	W	W	W	W ^{s1}	W ^{s1}
	Island Farm Area	H ^{s1}	H ^{s1}	H ^{s1}	H	CLOSED	CLOSED	CLOSED	CLOSED	H	H	H	H ^{s1}
	Southern Section of Unit IV (Sanctuary)	CLOSED ^s	CLOSED ^s	CLOSED ^s	CLOSED ^s	CLOSED	CLOSED						
	Roadside Viewing on Broadkill Beach Road	W	W	W	W	W	W	W	W	W	W	W	W

¹ Wetland areas only open to hunting during the snow goose conservation order from Jan/Feb through mid-April and will involve temporary closures of portions of the hunt area to other users
^{s1} Indicates a sanctuary area from the end of November through March 15 unless open for hunting during the snow goose conservation order (in the Island Farm Area, applies to all but the designated area for disabled waterfowl hunting)